



**SIBIS**  
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Statistical Indicators Benchmarking the Information Society

## **SIBIS – Workpackage 2: Topic research and indicator development**

Topic report No. 7: E-Commerce

TASK 2.1 - 2.2  
REVISED REPORT

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## Executive Summary

This report presents research on e-commerce to identify and construct innovative indicators for the Statistical Indicators Benchmarking the Information Society (SIBIS) project. Through analysing contemporary literature and existing studies within this area, which are thoroughly documented within the appendix, it has been possible to develop potential indicators to be measured within the forthcoming SIBIS field survey.

Electronic commerce (E-commerce) presents enormous possibilities for transforming business processes and commercial behaviour, as well as the broader socio-economic system in terms of consumer and government-societal interaction. Consequently, e-commerce activity has attracted the attention of policy makers and the media, as well as commerce and consumers looking to exploit its potential. With this interest there is a universal consensus that reliable e-commerce metrics are needed to track developments in this medium, and understand its impact on our economies and societies.

As a result of this interest, several agencies, governments, statistical offices, as well as private research organisations have undertaken statistical exercises aimed at capturing the most notable aspects of e-commerce and ICT usage. Within the domain of e-commerce there has been great strides in mapping these developments, however, there still remains a need to better articulate, through more in-depth assessment or through more sophisticated cross elaboration, than techniques previously used to measure the commencement and early take-off of the phenomenon. There is a need for indicators to capture the "intensity" and "impacts" of e-commerce, rather than measurements of the diffusion of ICTs used for e-commerce (based on "readiness" indicators).

Consequently, project SIBIS (Statistical Indicators Benchmarking the Information Society) adopted a definition endorsed by OECD, which is now widely used by researchers and national statistical offices, as well as Eurostat. The definition focuses on the implementation of electronic transactions, either on Internet networks (Narrow definition) or over any type of computer-mediated network (Broad definition). The method by which the order is placed or received, not the payment or the channel of delivery, determines whether the transaction is an Internet transaction (conducted over the Internet) or an electronic transaction (conducted over computer-mediated networks). SIBIS decided to follow this guide, which is useful to outline the gaps between existing indicators and needs for innovative ones. The framework of analysis developed by the OECD is articulated in three main stages, which captures the diffusion of the phenomena. These stages are; readiness, intensity, and impacts.

### Readiness Indicator

Indicators related to readiness are largely available across different studies and the geographical coverage is quite extensive (more so for consumers than for business users). SIBIS's analysis suggests to progress from the analysis of basic Internet readiness factors (such as the diffusion of Internet networks) to factors more specifically connected with e-commerce, which are less covered by existing surveys. SIBIS suggested indicators are segmented in the following sub-domains.

- ICT access availability indicators
- ICT Infrastructures
- Barriers.

### **Intensity Indicators**

The range of intensity indicators are quite varied, since no common metrics have been established yet, even if the type of questions asked are rather similar across the different surveys (frequency of transactions, products and services involved, etc.). There are still data collection problems (since the absolute numbers of businesses or consumers practicing e-commerce are still relatively low, which leads to sampling difficulties). Concerning businesses, there are still methodological problems about the best way to estimate the intensity of purchase/sales volumes (in absolute numbers, as a percentage of total purchases/sales). More generally, there is still uncertainty about which indicators, or combination of indicators, are more relevant to explain/predict the intensity of e-commerce usage. From this point of view, it is important to analyse user characteristics and their behaviour in more depth, while in present surveys segmentation is mostly limited to the basic categories of businesses and consumers. Therefore SIBIS's analysis focused on user profiles, i.e. the combination of their identifying characteristics, and the type and volume of transactions they engage in. Proposed sub-domains are articulated as follows:

- Users Profiles
- Type of Transactions
- Volume of Transactions.

### **Impacts Indicators**

SIBIS's contribution focuses on indicators for potential impacts at the micro-level, since this is necessary to build up to higher level impacts. The OECD working group on IS indicators for example has examined the relationship between ICT investments, innovation (including e-commerce) and business performance. It was concluded that more firm-level data is needed to provide better insight on the phenomenon, since macro and sectoral data is not sufficient<sup>1</sup>. Nevertheless, a suggested indicator for impacts is:

- User Benefits.

### **Development of composite indices**

The assessment of the various aspects of electronic commerce appears to obtain greater value by the development of composite indices that result from the aggregation of some of the basic indicators discussed previously. Therefore the report aims to provide some suggestions for the construction of such indices: beyond the readiness indices. Consequently, each index consists of a number of indicators that are aggregated, using a proposed formula that includes weighting of individual input indicators. Due to the framework of analysis proposed in the report, the development of composite indices will be undertaken both for the indicators of the forthcoming general population survey (focussed on consumer behaviour) and for the indicators of the decision maker survey (focussed toward business behaviour, but by virtue considers consumer activity).

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<sup>1</sup> "The OECD Working Party on Indicators for the Information Society (WPIIS): progress report and ideas for future work", 2002

# 1. Introduction

## 1.1. Overview of the Report

This report presents research on e-commerce to identify and construct innovative indicators for the Statistical Indicators Benchmarking the Information Society (SIBIS) project. Through analysing contemporary literature and existing studies within this area, which are thoroughly documented within the appendix, it has been possible to develop potential indicators to be measured within the forthcoming SIBIS field survey.

Chapter 1 presents the executive summary of the research undertaken herein.

Chapter 2 presents, as well as an overview of the report, a definition of e-commerce. In tying down both a broad and narrow definition of e-commerce, as defined by the OECD (through identifying electronic transactions, computer mediated networks, internet transactions, and the internet), it is possible to move away from the semantics, and deal with the issue of e-commerce indicators.

Chapter 3 presents the current status and problems of producing e-commerce indicators. Through developing the OECD's notion of diffusion of e-commerce, in terms of readiness, intensity and impacts, it is possible to outline gaps between existing indicators and the need for more innovative measurement approaches.

Chapter 4 presents suggestions for new indicators. After presenting a framework for e-commerce, in terms of the components of readiness (which include ICT availability, infrastructures etc.) to intensity (user profiles, types of transactions etc.) and impacts (user benefits, performance/innovation improvements etc.), the chapter goes on to detail how these factors may be collated in the SIBIS survey. The chapter details the components of B2C e-commerce and B2B e-commerce indicators, from the type of survey question to the target group the answer will be derived from.

Chapter 5 develops suggestions for composite indices. The chapter explores the potential/pitfalls of producing composite indicators. The use of appropriate weights to produce more effective composite indicators are presented and discussed.

Chapter 6 presents a summary of the finding of the investigation.

Within the appendix of Chapter 7, a substantive literature review has been included which will prove invaluable in understanding the how the readiness, intensity and impact assessments have been formulated.

## 1.2. Definition of E-commerce

Electronic commerce (E-commerce) has the potential to affect users behaviour, business processes and the socio-economic system, and therefore has always attracted a high level of attention from policy makers and the media. There is universal consensus that reliable e-commerce metrics are needed to track developments in this medium and understand its impact on our economies and societies.

E-commerce is a complex phenomenon whose specific definition can vary considerably. Project SIBIS adopted the definition endorsed by OECD in April 2000, which is now widely used by researchers and national statistical offices, as well as Eurostat. The definition focuses on the implementation of electronic transactions, either on Internet networks (Narrow definition) or over any type of computer-mediated network (Broad definition). **The method by which the order is placed or received**, not the payment or the channel of delivery, determines whether the transaction is an Internet transaction (conducted over the Internet) or an electronic transaction (conducted over computer-mediated networks). Guidelines for the interpretation of these definitions were defined by the OECD Working Party on Indicators for the Information Society (WPIIS) in April 2001. These definitions imply that the simple process of gathering information online does not constitute electronic commerce: in order for electronic transactions to take place, it is necessary that at least the ordering step is carried out.

Figure 1 The OECD definitions of electronic commerce transactions and proposed guidelines for their interpretation

E-commerce transactions	OECD definitions	Guidelines for the Interpretation of the Definitions (WPIIS proposal April 2001)
<b>BROAD definition</b>	An <b>electronic transaction</b> is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over <b>computer-mediated networks</b> . The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	<b>Include:</b> orders received or placed on any online application used in automated transactions such as Internet applications, EDI, Minitel or interactive telephone systems.
<b>NARROW definition</b>	An <b>Internet transaction</b> is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over the <b>Internet</b> . The goods and services are ordered over the Internet, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	<b>Include:</b> orders received or placed on any Internet application used in automated transactions such as Web pages, Extranets and other applications that run over the Internet, such as EDI over the Internet, Minitel over the Internet, or over any other Web enabled application regardless of how the Web is accessed (e.g. through a mobile or a TV set, etc.) <b>Exclude:</b> orders received or placed by telephone, facsimile, or conventional e-mail.

Source: OECD IT Outlook 2002, Chap. 4

## 2. Framework

### 2.1. E-commerce Indicators: status and problems

E-commerce must not be regarded as an insulated phenomenon, but rather as an expression of the wider process of digitalisation of the economy as a whole. Therefore, it is advisable to consider the measurement of electronic commerce as a crucial step in the path of measuring the digital economy. The evaluation framework to be applied should be modular and expandable.

E-commerce is not limited to the technical implementation of the necessary infrastructure, since it involves the interplay between technology and business. In fact, e-commerce concerns the online provision of products and services, but it implies a set of consequent changes in business processes and internal organisation of the companies who implement it.

E-commerce drives a process of value chain deconstruction and reconstruction, since most components of the business functions can be organised by electronic means. As a consequence, some intermediaries will disappear, while new agents will emerge. Therefore, electronic commerce leads to the development of new business models. This phenomenon often requires substantial organisational adaptations and learning. Again, this drives the need for articulated indicators of this evolution.

Demand for statistics measuring e-commerce has generated a multiplication of surveys and estimates not easily comparable, whose reliability is always difficult to assess. According to the OECD, in June 2002 "*Despite very recent efforts by national statistical offices, international comparable statistics measuring the level, growth and composition of e-commerce transactions are not yet available*"<sup>2</sup>. The agreement by OECD member countries on the definitions outlined above represent a definite progress, as well as the adoption of a model questionnaire inspiring the Eurostat pilot surveys implemented in 2001 and 2002. However, while some basic ground about the general characteristics of the phenomenon has been covered, clearly there is still a long way to go in term of understanding its development and impacts, which is the direction taken by SIBIS work. Even the Eurostat pilot surveys (which have been carefully considered in this report) leave several methodological problems still open and, being pilots, have some shortcomings in terms of geographical and sectoral coverage of the economy. The SIBIS population and business establishment surveys commented in this report provide complementary evidence and stimulation for further reflection on e-commerce measurement issues.

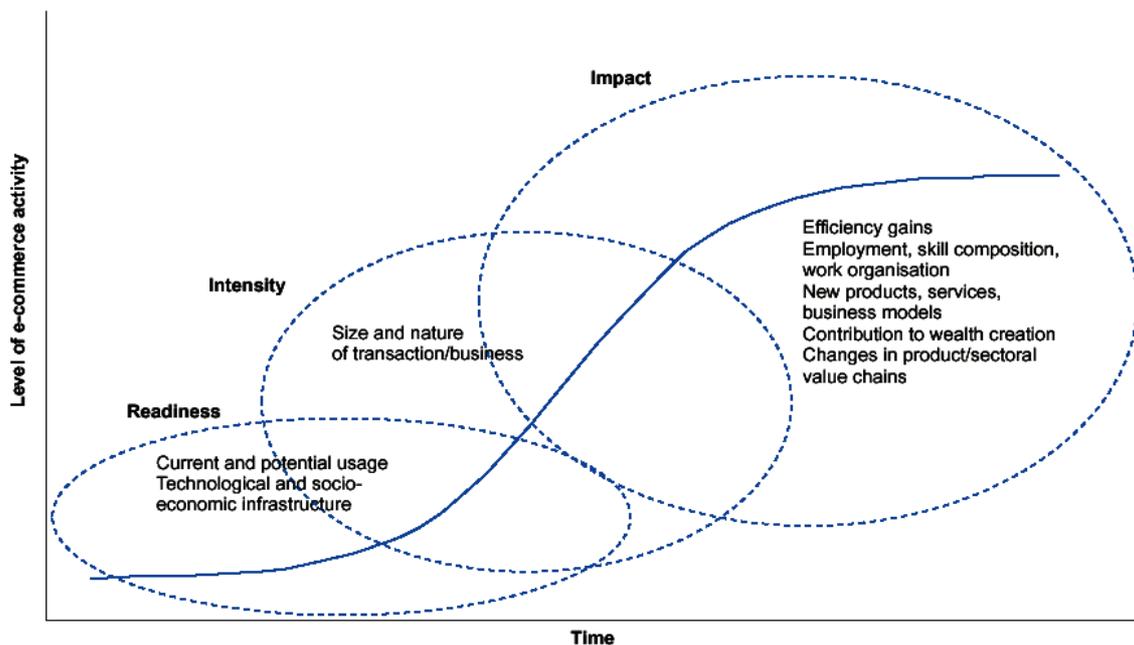
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<sup>2</sup> IT Outlook 2002, OECD

## 2.2. E-Commerce Indicators: Assessment Framework

The OECD developed a useful framework defining three areas of e-commerce measurement based on policy makers and other user needs, along the S-shaped diffusion path of new technologies: **readiness, intensity and impact**. SIBIS decided to follow this framework which is useful to outline the gaps between existing indicators and needs for innovative ones.

Figure 2 Diffusion of e-commerce in terms of Readiness, Intensity and Impacts



Source: OECD (1999), based on Industry Canada

**Readiness indicators** concern enabling factors (technological and socio-economic infrastructures) and barriers for the implementation of electronic commerce. The technological infrastructure refers to the availability of ICT hardware and the existence of (as opposed to usage of) ICT networks. The socio-economic infrastructure is made up by attitudes towards ICT as well as by ICT skills – i.e. the willingness and ability to use e-commerce.

**Intensity indicators** measure the nature, volume and growth of e-commerce transactions and are needed to enable policy makers to address imbalances. Intensity indicators have emerged more recently, thanks to the growth of e-commerce (which allows more in-depth analysis) and have usually been proposed by country-specific statistical documents. The aspects analysed include:

- frequency and repetitiveness of purchase/sales;
- phase of the transaction in which e-commerce is used (information gathering, ordering, payment, delivery etc.);
- actors involved and their profiles (businesses, consumers, government agencies);

- products and services involved (with specific attention to the differences between material and immaterial goods);
- scope of the transaction: domestic, international, urban or rural.

**Impact indicators** measure the social and economic impact of electronic commerce, potentially very relevant. This is a particularly difficult area, not only because of the recent development of this phenomenon, but also because it means to devise ways to measure and scale up possible impacts from the micro level (single companies, individual users) to the *meso* level (industry sector, user segments) and the macro level (the economic and social system). Moreover, there are no simple causal relationships in this area: it is already a success to be able to correlate e-commerce adoption with certain socio-economic impacts as a leading factor of their occurrence. Therefore, impact indicators are very rare and research so far has suffered from a severe lack of data, especially from Europe.

Potential impacts of e-commerce include:

**At the macro level:**

- impacts on productivity, economic and employment growth, balance of national/international trade (by country and/or by sector);
- impacts on taxation, pricing and inflation;
- impacts on skills demand, the education and training system;
- impacts on social exclusion/inclusion;

**At the meso-sectoral level:**

- impacts on markets structure, re-intermediation and dis-intermediation, value chains evolution;

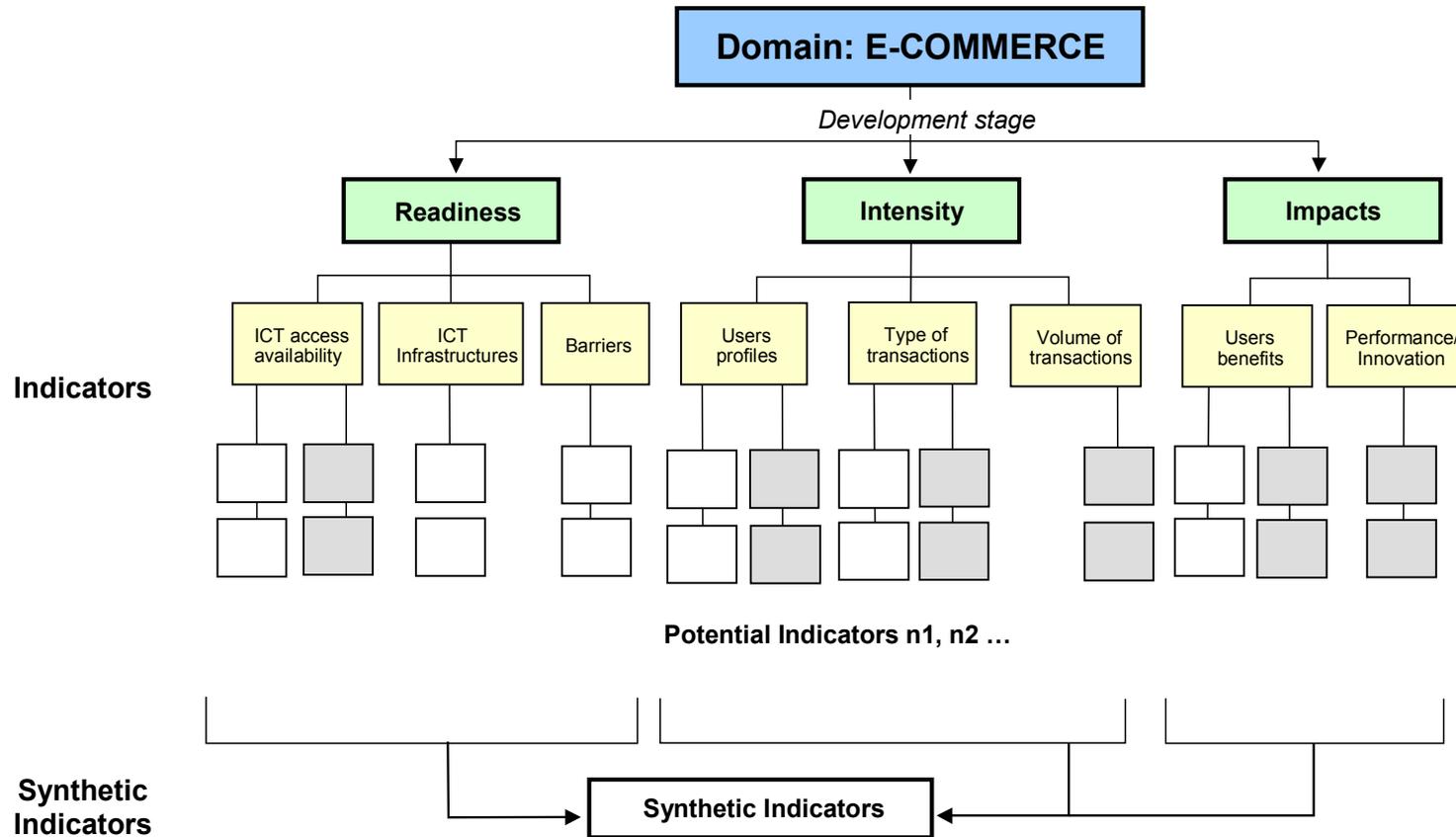
**At the micro level:**

- impacts on consumers behaviour, perceptions of security/privacy/ trust and confidence in transactions;
- impacts on businesses/organisations performance (efficiency gains, costs, sales, market share, profits, products/services innovation and quality, customer satisfaction);
- impacts on businesses/organisations processes and internal/external relationships with customers/suppliers.

### 3. Suggestions for New SIBIS indicators

The framework of indicators suggested by SIBIS follows the structure of analysis explained in the previous chapter, based on the stages of development of e-commerce. The indicators are divided for the two main categories of core stakeholders, that is consumers and businesses. Some of the indicators suggested apply also to government organisations: in this case this has been underlined. The following chart illustrates the hierarchy of indicators, focusing on the innovative indicators suggested by SIBIS and tested in the SIBIS surveys. Existing indicators well covered by existing surveys are not included (even when they are of basic importance) as they have already been illustrated in the previous SIBIS e-commerce report.

Figure 3 Framework of e-commerce indicators



Source: Databank Consulting

### 3.1. Readiness Indicators

These indicators are largely available across different studies and the geographical coverage is quite extensive (more so for consumers than for business users, though). SIBIS analysis suggests to progress from the analysis of basic Internet readiness factors (such as the diffusion of Internet networks) to factors more specifically connected with e-commerce, which are less covered by existing surveys. The simple dichotomy "has or does not have Internet access" is no more sufficient since, as the market grows, the users population tends to segment into occasional and frequent or more sophisticated users. Typically, e-commerce buyers tend to be the more frequent and/or sophisticated user, so to analyse their characteristics is relevant for the evaluation of e-commerce readiness.

SIBIS suggested indicators are segmented in the following sub-domains.

- **ICT access availability indicators**

Access availability is considered from the user's viewpoint. Concerning consumers, this study underlines two aspects usually not well investigated. The first is the use of Internet access devices different from the PC: platforms such as Digital TV or the mobile phone lend themselves well to certain mass-market e-commerce services. The second is the profile of Pc users who do not access the Internet vs. those who do. From the point of view of demand dynamics analysis, understanding who are the users who refuse to go online can be very important.

Indicators for business users focus on the co-presence of main ICT services in an organisation and the level of employee access to them. These elements help to segment the business users population by level of sophistication and access to ICTs.

- **ICT Infrastructures**

The suggested indicator is the diffusion of SSL, secure servers representing a key marker of the feasibility of secure online payments, a powerful proxy of a country's infrastructures ability to enable e-commerce singled out also by OECD. This indicator is presently produced by a private company (Netcraft) but it would be very interesting to include it in the list of indicators publicly provided. It was not included in SIBIS questionnaires because this indicator is generated by a search of the web and not by a survey of final users such as our project's one.

- **Barriers**

Most e-commerce surveys include questions on barriers to adoption of e-commerce, both for consumers and businesses. SIBIS suggested indicators focus on the barriers related to security problems for **consumers**, which are known to be a very important factor, both for objective and psychological reasons. The indicators suggested explore the causality link between the perception of security problems and the decision to buy online, confirming that the link is rather strong.

## 3.2. Intensity Indicators

The range of intensity indicators is quite varied, since no common metrics have been established yet, even if the type of questions asked are rather similar across the different surveys (frequency of transactions, products and services involved, etc.). There are still data collection problems (since the absolute numbers of businesses or consumers practicing e-commerce are still relatively low, which leads to sampling difficulties). Concerning businesses, there are still methodological problems about the best way to estimate the intensity of purchase/sales volumes (in absolute numbers, as a percentage of total purchases/sales). More generally, there is still uncertainty about which indicators, or combination of indicators, are more relevant to explain/predict the intensity of e-commerce usage.

From this point of view, it is important to analyse users characteristics and their behaviour more in depth, while in present surveys segmentation is mostly limited to the basic categories of businesses and consumers. Therefore SIBIS analysis focused on users profiles, i.e. the combination of their identifying characteristics, and the type and volume of transactions they engage in.

Compound indicators, respectively of the intensity of diffusion of B2C e-commerce by country and of B2B e-commerce by macro sector have been calculated and are explained in detail in the following chapter.

Suggested indicators are articulated as follows.

- **Users Profiles**

The analysis of **consumer** profiles depends on their main socio-demographic characteristics, in comparison with Internet users who are not buyers. This should allow identification of the discriminating characteristics correlated with e-commerce activity. Another indicator suggested is the identification of mobile buyers, a recently emerging phenomenon.

Concerning **businesses**, SIBIS suggests a classification of users based on the stage of development of their usage of e-commerce, from "basic off liners" to "all-rounders" (who have deeply integrated e-commerce and e-business in their transactional processes). This model based on previous research by empirica is useful to provide a synthetic overview of the type of e-commerce business user. SIBIS survey data allows estimating how many companies fall into the different typologies. A very important complementary element is the target market addressed by the e-commerce seller.

- **Type of Transactions**

Concerning **consumers**, one indicator suggested segments users by intensity of Internet usage (time spent on the networks) and compares the type of transactions they engage in. Another one segments user by their experience on the Net (how long ago they started navigating) and again compares the type of their transactions. This type of analysis helps to evaluate which aspects are more relevant to understand e-commerce usage dynamics (for example, is presence on the Net or experience more important?) and therefore which questions may be dropped or can be used as synthetic proxy of other more relevant aspects in future surveys. These indicators lead the way towards designing the profile of the occasional vs. sophisticated user for e-commerce and a more accurate segmentation.

Concerning **businesses**, two aspects singled out by SIBIS survey because they are not usually covered are the type of activity done in e-marketplaces by companies using them, and the

presence of call centres in companies doing e-commerce (signalling a comprehensive customer relationship strategy, if not the presence of CRM applications as such).

- **Volume of Transactions**

Concerning **consumers**, the most common question is the amount of online purchases in the most recent period. SIBIS suggests as particularly relevant a question on the willingness to repeat online purchases, as an indirect measure of customers satisfaction. This question was not included in the SIBIS questionnaire for lack of space.

Concerning **businesses**, the volume of sales realised online in percentage on total sales is the most common indicator in recent surveys. SIBIS suggests to go one step beyond and compare the intensity of sales by customer target (consumer, business, government) in order to better focalise the marketing strategies of interviewed companies.

### 3.3. Impacts Indicators

SIBIS's contribution focuses on indicators for potential impacts at the micro-level, since this is necessary to build up to higher level impacts. The OECD working group on IS indicators for example has examined the relationship between ICT investments, innovation (including e-commerce) and business performance. It was concluded that more firm-level data is needed to provide better insight on the phenomenon, since macro and sectoral data is not sufficient<sup>3</sup>.

A key aspect for impacts indicators aimed at businesses is segmentation by industry sector, even if this cannot be overly articulated. All studies on e-commerce point out that industrial sectors' are one of the most important factors - possibly the single most important one - to understand patterns of adoption of e-commerce and its impacts. As a minimum, a distinction should be made between manufacturing and services organisations. Therefore SIBIS suggests segmentation by macro sector, which tries to address the most relevant differentiations occurring in e-commerce implementation in the marketplace.

Most recently, some national statistical offices have started to carry out elaborations linking the results of the pilot Eurostat e-commerce surveys (providing indications on which enterprises are implementing e-commerce) with other, larger databases on firms micro data. This allows the exploration of the relationship between the new information economy and business activity and results so far look very interesting.

The indicators are articulated as follows:

- **Users Benefits**

Concerning **consumers**, the indicators suggested measure the perceived benefits from e-commerce and the overall satisfaction with online purchases. These indicators are relevant to gather evidence about the actual impacts of the adoption of e-commerce on consumers behaviour. These indicators could not be implemented because the casual sample addressed by the project's population survey includes a share of e-commerce users too small for this type of analysis.

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<sup>3</sup> "The OECD Working Party on Indicators for the Information Society (WPIIS): progress report and ideas for future work", 2002

Concerning **businesses**, the indicators suggested to focus first on all the assessment by users themselves of the existence of impacts from online sales and online purchases. The indicator proposed is a semantic one (ranging from very positive to very negative) since it would be very difficult to estimate quantitative values for the items proposed. The list of items proposed is derived from the most frequent range of impacts detected in research on companies implementing e-commerce. Various analyses suggest that e-commerce cannot be isolated as the single factor driving organisational innovation<sup>4</sup>. However, since we are still in the first phase of growth of the phenomenon, the perception of benefits by actual users is very important to reinforce diffusion and strengthen motivation of adoption of e-commerce.

Another indicator suggested looks at the relevance of perceived impact of sales depending on target markets, measured in terms of intensity of sales to them (consumers, businesses or government).

**Table 1 Indicators of B2C e-commerce**

N.	Development Stage	Sub-domain	Indicator Name <sup>5</sup>	Existing <sup>6</sup>	New Sibis <sup>7</sup>		Compound Indicator
					Selected <sup>8</sup>	Not selected	
1	Readiness	ICT access availability	N. of users accessing the Internet		X		
2	Readiness	ICT access availability	N. of users accessing the Internet via alternative access devices		X		
3	Readiness	ICT access availability	Share of off line users (who don't access the Internet) over total PC users		X		
4	Readiness	ICT infrastructures	Secure servers for e-commerce	X		X	
5	Readiness	Barriers	Effects of Security Concerns on e-commerce behaviour		X		
6	Readiness	Barriers	Relevance of web security features in e-buying decision		X		
7	Intensity	Users Profiles	Socio-demographic profile of e-commerce buyer	X	X		
8	Intensity	Users Profiles	Mobile commerce users viewing WAP pages		X		
9	Intensity	Users Profiles	Mobile commerce users		X		
10	Intensity	Type of transactions	Intensity of Internet usage		X		
11	Intensity	Type of transactions	Attitude to online transactions		X		
12	Intensity	Type of transactions	Experience in Internet usage		X		

Source: Databank Consulting

<sup>4</sup> "STAR research shows that industries do not change simply because the Internet opens up new commercial possibilities. The implementation of Internet e-business applications is part of a sustained trajectory of organisational and business process change. (...) The Internet does not produce business model transformation, but it can support and enhance change". From Europe, the Digital Way - project STAR Annual report 2001; "Electronic Commerce and Business Models evolution" Issue Report n.5, by SPRU, July 2001, www.databank.it/star

<sup>5</sup> Information in the annex of the present document

<sup>6</sup> From published sources

<sup>7</sup> Developed within the project

<sup>8</sup> Included in the survey

**Table 2 Indicators of B2B e-commerce**

N.	Development stage	Sub-domain	Indicator Name <sup>9</sup>	Existing <sup>10</sup>	New Sibis <sup>11</sup>		Compound Indicator
					Selected <sup>12</sup>	Not selected	
1	Readiness	ICT access availability	ICT Use: Presence of ICT services - internet	X	X		
2	Readiness	ICT access availability	ICT Use: Presence of ICT services - intranet	X	X		
3	Readiness	ICT access availability	ICT Use: Presence of ICT services - EDI	X	X		
4	Readiness	ICT access availability	ICT Use: Presence of ICT services – EDI internet based	X	X		
5	Readiness	ICT access availability	ICT Use: Presence of ICT services – presence of an extranet	X	X		
6	Readiness	ICT access availability	Breadth of ICT services access by majority of employees		X		
7	Intensity	Users Profiles	Share of businesses selling online	X	X		
8	Intensity	Users Profiles	Share of businesses offering online reservations	X	X		
9	Intensity	Users Profiles	Online Sellers by customer target (businesses, consumers, public sector)		X		
10	Intensity	Users Profiles	Share of establishments according to e-commerce typology		X		
11	Intensity	Users Profiles	Share of establishments purchasing online by E-commerce type and sector		X		
12	Intensity	Type of Transactions	Dual channel e-commerce (share of firms selling on line with call centre)		X		
13	Intensity	Type of Transactions	Participation in e-marketplaces (type of activity)		X		
14	Intensity	Volume of Transactions	Share of online sales by customer target (consumer, business, public sector)		X		
15	Impacts	Users Benefits	Self-assessed impacts of online sales		X		
16	Impacts	Users Benefits	Self-assessed impacts of online purchases		X		

Source: Databank Consulting

<sup>9</sup> Information in the annex of the present document

<sup>10</sup> From published sources

<sup>11</sup> Developed within the project

<sup>12</sup> Included in the survey

### 3.4. Description of indicators for the General Population and Decision Makers Survey (GPS/DMS)

The following tables illustrate the proposed indicators to be used in the general population survey (GPS) and decision maker survey (DMS).

GPS indicators are directed at measuring the readiness, intensity and impact of electronic commerce from consumers' perspective and therefore relate exclusively to business-to-consumer electronic commerce. For each constructed dimension it is proposed that one or more questions be used: the indicators that are used to measure electronic commerce can be either illustrated by single questions (simple indicators), or can be developed as the composition of more questions (complex indicators). Since we are aware that not all the indicators will be used in the SIBIS survey, we suggest an order of priority - high, medium, low - for all the indicators. This order takes into account both the relative importance of each indicator per se and the availability of these indicators across the already existing studies (e.g. if an indicator is very important, but is extensively present in the literature, then it will be given a "medium priority").

The DMS tables illustrate the proposed indicators to be used in the decision maker survey. These indicators are directed at measuring the readiness, intensity and impact of electronic commerce from businesses' perspective and therefore relate both to business-to-consumer and to business-to-business electronic commerce. For each construct dimension we propose one or more questions: the indicators that are used to measure electronic commerce can be either illustrated by single questions (simple indicators), or can be developed as the composition of more questions (*complex* indicators).

#### GPS indicators

<b>Definition</b>	<b>1 – N. of users accessing the Internet</b>
<b>Notes on Methodology</b>	This indicator provides information on the number of Internet users who access the Internet in the four weeks before the interview (defined as devices different from a PC or a Mac).
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	In the last four weeks, have you accessed the Internet in any other way then via a PC or Mac, at least once?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>2 – N. of users accessing the Internet via alternative access devices</b>
<b>Notes on Methodology</b>	This indicator provides information on the number of Internet users who used alternative access devices in the four weeks before the interview (defined as devices different from a PC or a Mac). The interviewees have been asked to select, through multiple choice, which are the media other than PC used for accessing to the Internet among TV, PDA/palmtop, mobile phone with WAP or 2.5G capacity, game console or other devices.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	In the last four weeks, have you accessed the Internet in any other way then via a PC or Mac, at least once?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>3 – Share of Offline PC users over total PC users</b>
<b>Notes on Methodology</b>	This indicator provides indications on the number and socio demographic characteristics of PC users who have not accessed the Internet in the four weeks preceding the interview. It contributes to understand some features of the digital divide among the various socio-demographics groups and countries
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	Have you used a PC, Mac or any other computer, for work or for private purposes and was it connected to the internet (filtered question)?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>4 – Secure servers for e-commerce</b>
<b>Notes on Methodology</b>	This indicator measures the number of secure servers per 1 million inhabitants. It is a relevant measure of e-commerce readiness, being security one of the most relevant barriers to the full deployment of e-commerce potential.
<b>Sources for details and availability</b>	Netcraft
<b>Countries covered</b>	OECD countries
<b>Time series available</b>	2000
<b>Measurement</b>	Secure Socket Layer use
<b>Source</b>	OECD Communications Outlook

<b>Definition</b>	<b>5 – Effects of security concerns on e-commerce behaviour by country</b>
<b>Notes on Methodology</b>	As security is considered a major barrier to online growth, respondents concerned about security were asked if this was a barrier stopping them from buying online
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	Are security concerns stopping you from using the Internet to buy goods or services online?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>6 – Relevance of web security features in e-buying decision</b>
<b>Notes on Methodology</b>	Respondents having ordered a product/service and/or conducted online banking were asked how often they take security features of websites into account when deciding whether to buy online.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	How often do you take security features of websites into account when deciding about whether to buy online?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>7 – Socio demographic profile of e-commerce buyer</b>
<b>Notes on Methodology</b>	This indicator allows to compare the socio-demographic profile of e-commerce buyers (i.e. people ordering online), of online interactive users (individuals who have engaged in searching information on products and services, ordering on line and conducting online banking in the last 12 months) and of average PC users.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	For your private purposes, have you used the Internet in the last 12 months to order a product or a service, or to conduct online banking or to buy financial products
<b>Target Group</b>	GPS

<b>Definition</b>	<b>8 – Mobile commerce users viewing WAP pages</b>
<b>Notes on Methodology</b>	This indicator calculates the number of mobile phone users who have viewed WAP pages
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15+ Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	Have you used your mobile phone to view web-pages or WAP pages or tend to read your email, at least once in the last 4 weeks?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>9 – Percentage of Mobile commerce users</b>
<b>Notes on Methodology</b>	This indicator calculates the percentage of mobile phone users who have used their mobile phone in the last 12 months to make purchases, download information or make payments.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15+ Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	Have you used your mobile phone at least once in the last 12 months to make any purchases on the internet, to download online information you were charged for or made online payments?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>10 – Intensity of Internet usage</b>
<b>Notes on Methodology</b>	This indicator is based on the intensity of internet usage (in terms of hours spent every week on the net).
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	How much time do you spend in a typical week using the Internet?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>11 – Attitude to online transactions</b>
<b>Notes on Methodology</b>	This indicator is based on internet usage (in terms of hours spent every week on the net) and users activity in online transactions, such as finding information, ordering a product and conducting online banking.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15 + Switzerland + USA
<b>Time series available</b>	2002
<b>Question</b>	For private purposes, have you used the Internet in the last 12 months to find, information, order a product, or conduct online banking?
<b>Target Group</b>	GPS

<b>Definition</b>	<b>12 – Experience of Internet usage</b>
<b>Notes on Methodology</b>	This indicator is based on a experience of internet usage and users' attitude to do online transactions.
<b>Sources for details and availability</b>	SIBIS GPS
<b>Countries covered</b>	EU15+ Switzerland + USA
<b>Time series available</b>	
<b>Question</b>	When did you use the Internet for the first time, < 6 months ago, 6-12 months ago, or 2year + ago?
<b>Target Group</b>	GPS

## DMS indicators

<b>Definition</b>	<b>1 - ICT Use: Presence of ICT services - Internet</b>
<b>Notes on Methodology</b>	This indicator is based on the presence of the Internet
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Does your establishment have access to the WWW, i.e. the Internet?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>2 - ICT Use: Presence of Intranet</b>
<b>Notes on Methodology</b>	This indicator is based on the presence of an intranet
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Does your establishment have an extranet?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>3 - ICT Use: Presence of EDI</b>
<b>Notes on Methodology</b>	This indicator is based on the aggregated elaboration of questions on the presence of Internet, Extranet, Intranet, EDI over IP in establishments and their level of co-presence
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Does your establishment use EDI?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>4 - ICT Use: Presence of EDI – internet based</b>
<b>Notes on Methodology</b>	This indicator is based on the presence of EDI utilised over the Internet?
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Is your EDI Internet based?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>5 - ICT Use: Presence of an extranet</b>
<b>Notes on Methodology</b>	This indicator is based on the presence of EDI utilised over the Internet?
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Does your establishment have an extranet?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>6 - Breadth of ICT services access by majority of employees</b>
<b>Notes on Methodology</b>	This indicator has been selected with the aim to provide a realistic picture of the penetration of ICT in enterprises. The SIBIS DMS asked to the establishments interviewed of the number of ICT services accessible by the majority of their employees. Data analysis can be articulated both per country and per business sector
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Can the majority of your office workers send emails to external addresses and browse internet/intranet sites?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>7 - Share of businesses selling online</b>
<b>Notes on Methodology</b>	This is not, by itself, an innovative indicator, but the number of businesses who sell online is a basic indicator necessary to measure the relevance of e-commerce.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Do you sell goods via the Internet?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>8 - Share of businesses offer reservations (selling online)</b>
<b>Notes on Methodology</b>	This is not, by itself, an innovative indicator, but the number of businesses who sell online is a basic indicator necessary to measure the relevance of e-commerce.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Do you offer reservations online?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>9 - Online Sellers by customer target (businesses, consumers and public sector)</b>
<b>Notes on Methodology</b>	This indicator looks at the percentage of establishments selling online which address a specific target market, either businesses, consumers or the public sector.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Are some of your online sales to, business, consumers, or public sector?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>10 - Share of establishments according to e-commerce typology</b>
<b>Notes on Methodology</b>	SIBIS developed a classification of enterprises based on the type of transactions they carry out over the Internet and the type of ICT services they employ (e-commerce typology) as follows: <b>Offline:</b> Establishments without access to the Internet, e-mail and without a Website <b>basic online:</b> Establishments without a presence on the Internet (e.g. Website), but with access to the Internet or e-mail. <b>web marketing:</b> Establishments with a presence on the Internet (e.g. Website), but none of the following <b>web sales:</b> Establishments that sell goods or services via the Internet (through own Website and/or via e-marketplaces), but none of the following <b>Closed Business Network Integration:</b> Establishments that use EDI or Extranets for communication with forward or backward linkages in the communication network, but none of the following <b>All round e-commerce:</b> Establishments that sell online as well as practice value chain integration
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Measurement</b>	All establishments weighted by employment, established in questionnaire through seeking industrial activity of interviewee – What is your main industrial activity?: Macro sector 1 – Manufacturing, energy, mining construction; Macro sector 2 – Distribution, catering, communication & transport; Macro sector 3 – Financial and business services; Macro sector 4 – Public administration, health, education, other social/personal services
<b>Target Group</b>	DMS

<b>Definition</b>	<b>11 - Share of establishments purchasing online by E-commerce type and sector</b>
<b>Notes on Methodology</b>	To complete the E-commerce typology, it was decided to compute separately the incidence of establishments purchasing online for every type and every macro sector.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Measurement</b>	Macro sectors assessed against business conducting business offline, basic online, web marketing, web sales, closed network business integration, all round e-commerce.
<b>Target Group</b>	DMS

<b>Definition</b>	<b>12 - Dual channel e-commerce (share of firms selling on line with call centre) by sector</b>
<b>Notes on Methodology</b>	This indicator provides data on establishing if those companies that sell online have a call centre
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	Does your establishment use a call centre for communications with customers or other external contacts?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>13 - Participation in e-marketplaces by sector and type of activity</b>
<b>Notes on Methodology</b>	This indicator provides data on the type of activity that businesses participating in e-marketplaces engage in. The activities listed include: <i>catalogue based offering and purchasing of products and services, auctions as a seller and as a bidder, launching call for tenders, answering calls for tenders, powerbuying</i> . Data reported include only catalogue based offering and purchasing.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	On e-marketplaces different types of business transactions can be accomplished, in which of the following types is your establishment activity involved: public and social services, financial and business services, distribution, or manufacturing?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>14 - Share of online sales by customer target (consumer, business, public sector)</b>
<b>Notes on Methodology</b>	In this case, establishments selling online have been grouped according to the revenues they generate online. This task was aimed at calculating the incidence of revenues generated by B2B, B2C and B2G according to the target users (businesses, consumers and public sector). Incidence of online revenues have been not calculated on the establishments' total revenues, but on the revenues generated for every specific target of users.
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	How large a share of your total sales to businesses (consumers, public sector) are conducted online?
<b>Target Group</b>	

<b>Definition</b>	<b>15 - Self-assessed impacts of online sales</b>
<b>Notes on Methodology</b>	This indicator analyses the impacts of online sales as perceived by the interviewed. Respondents were asked to assess the impact of e-sales on their <i>sales, costs, sales area, on the quality of their customer services, on the efficiency of their business processes</i> according to a scale in 5 steps, from "very negative" to "very positive".
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	2002
<b>Question</b>	According to your experience, what effect has selling online had on quality, efficiency, sales, sales area, cost?
<b>Target Group</b>	DMS

<b>Definition</b>	<b>16 - Self assessed impacts of online purchases</b>
<b>Notes on Methodology</b>	This indicator analyses the impacts of online purchases as perceived by the interviewed. Respondents were asked to assess the impact of e-purchases on their procurement costs, stock keeping of MRO goods, of the number of suppliers and relationship with suppliers and efficiency of internal business processes according to a scale in 5 steps, from "very negative" to "very positive".
<b>Sources for details and availability</b>	SIBIS indicator
<b>Countries covered</b>	Finland, France, Germany, Greece, Italy, Spain, U.K.
<b>Time series available</b>	
<b>Question</b>	According to your experience, what effect has online procurement on: procurement costs, efficiency, supplier relationships, supplier numbers, and MRO stocks?
<b>Target Group</b>	DMS

## 4. Suggestions for composite indices

The assessment of the various aspects of electronic commerce may receive greater value by the development of composite indices that result from the aggregation of some of the basic indicators illustrated before. Therefore in this chapter, we provide some suggestions for the construction of such indices: beyond the readiness indices, which will rely also upon some already existing indicators, all the composite indices will be developed exclusively on the basis of the indicators for the SIBIS survey. According to the general guidelines of the SIBIS project, each index consists of a number of indicators that are aggregated, using a formula that includes weighting of individual input indicators. Due to the framework of analysis proposed in the report, the development of composite indices will be done both for the indicators of the general population survey and for the indicators of the decision maker survey.

If we look at the tree of indicators for both surveys, we can identify three broad sub-domains: readiness, intensity and impact. The ultimate goal of the project in this research field would be to obtain a single indicator for each of the three areas. However, due to the complexity of evaluating the impact of electronic commerce - especially at the level of businesses - the proposal goes in the direction of developing more than three composite indices, which help measure different aspects of electronic commerce without losing the richness involved in the indicators/sub-indicators. Furthermore, since we have built two different sets of indicators for the general population survey and for the decision maker survey, we will have two separate lists of composite indexes for the two surveys.

### 4.1. General population survey

The first index we propose is an index for the electronic commerce readiness and is made of two types of indicators: some are taken from the available statistics and refer to the diffusion of ICT, while others are part of the list of the SIBIS indicators and concern more qualitative aspects of the electronic commerce readiness - quality of Internet usage. Within the first group we include: the number of Internet hosts, the number of computer illiterates, the number of Internet users, and the number of secure servers for electronic commerce. Within the second group, we include Internet usage (1) and barriers to electronic commerce (2). The indicator 1 is a complex indicator, which includes the frequency of accessing the Internet (1a) and the scope of accessing the Internet (1b). These two components should have the same weight in defining the "quality" of Internet Usage (0.50). The indicator 2 represents an inverse measure of the electronic commerce readiness and this should be taken into account when developing the composite index. In terms of weights, we decide to give slightly more importance to the Internet Usage, since it constitutes a *sine qua non* condition for the performance of electronic commerce transactions.

Index	Electronic commerce readiness	
	Internet hosts	Weight: .10
	Internet users	Weight: .10
	Computer illiterates	Weight: .10
	Secure web servers for e-commerce	Weight: .10
Indicator 1	Internet Usage	Weight: .35
Indicator 2	Barriers to electronic commerce	Weight: .25

The second index we suggest refers to the electronic commerce intensity and is composed of three indicators: type of electronic commerce processes (3), on-line expenditure (4) and repetition of on-line purchase (6). It would be interesting to include in the intensity index the indicators related to mobile commerce, although with a small weight - the intensity of mobile commerce accounts for the stage of development of electronic commerce, but it is not one of the main indicators. We assign a weight of 0.4 to the volume and to the repetition of on-line transactions, and a weight of 0.2 to the type of electronic commerce processes, considering that the issue of the complexity of electronic transaction is less relevant to assess the electronic commerce intensity, at least in this stage.

Index	Electronic commerce intensity	
Indicator 3	Electronic commerce processes	Weight: .20
Indicator 4	Volume of on-line purchases	Weight: .40
Indicator 6	Repetition of on-line purchases	Weight: .40

The third index we recommend is an index of the electronic commerce impact, which takes into account both the satisfaction of the consumers (8) and the degree to which consumers are willing to substitute off-line transactions with on-line commerce (9). These indicators are considered to be relevant in determining the impact of electronic commerce on the consumers' behaviour: however, the willingness to purchase products/services exclusively on-line appears to be a strong signal of impact and therefore is given a higher weight (0.60).

Index	Electronic commerce impact	
Indicator 8	Satisfaction	Weight: .40
Indicator 9	Substitution	Weight: .60

## 4.2. Decision maker survey

Following the scheme adopted for the general population survey, the first composite index we propose for the decision maker survey is an index of readiness, which combines the indicators on the usage of ICT and of the Internet and the indicator on the barriers to electronic commerce and electronic procurement. It is important to remember that the existence of a web site (11a) and the scope of the web site (11b) are equally relevant indicators of the Internet usage and should be weighted accordingly. As we have underlined for the GPS readiness index, we consider the usage of the technology to be a fundamental pre-condition for the implementation of electronic commerce and we attribute to this indicator a higher weight.

Index	Electronic commerce readiness	
Indicator 10	ICT usage	Weight: .30
Indicator 11	Internet usage	Weight: .30
Indicator 12	Barriers to electronic commerce	Weight: .20
Indicator 13	Barriers to electronic procurement	Weight: .20

The second composite index we recommend for the DMS is an index of intensity, which combines the indicator 14 of on-line sales, the indicator 15 of markets and the indicator 18 of on-line procurement. We suggest that indicator 15 and indicator 18 are weighted more than indicator 14, since they are relatively more relevant for the assessment of the electronic commerce intensity.

Index	Electronic commerce intensity	
Indicator 14	On-line sales	Weight: .35
Indicator 15	Markets	Weight: .30
Indicator 18	E-procurement	Weight: .35

Finally, we concentrate the attention on the electronic commerce impact. In this context, we suggest in the first place the development of three composite indices, one for productivity, one for internal processes, and one for external relationships. Secondly, it may be interesting to combine these composite indices with the indicator of employment, which does not need further synthesis to obtain one general index of electronic commerce impact. For the productivity indicator, we remember that the answers range from "not at all" to "significantly": therefore the value has to be weighted ranges from 1 to 3.

Index	Electronic commerce impact - productivity (Indicator 19)	
	Increased Sales	Weight: .20
	Decreased Costs	Weight: .20
	Increased value added	Weight: .20
	Changes in the level of prices	Weight: .20
	Changes in the structure of prices	Weight: .20

Index	Electronic commerce impact - internal processes (Indicator 21)	
Indicator 21a	New business functions	Weight: 1/3
Indicator 21b	Efficiency of internal processes	Weight: 1/3
Indicator 21c	New position in the value chain	Weight: 1/3

Index	Electronic commerce impact - external relationships (Indicator 22)	
Indicator 22a	Inter-firm alliances/agreements	Weight: .25
Indicator 22b	New products/services	Weight: .25
Indicator 22c	New groups of customers	Weight: .25
Indicator 22d	New geographical markets	Weight: .25

Index	Electronic commerce impact	
Indicator 19	Productivity	Weight: .25
Indicator 20	Employment	Weight: .25
Indicator 21	Internal processes	Weight: .25
Indicator 22	External relationships	Weight: .25

If one wants to expand the analysis to the impact of electronic procurement, it would be possible to build a further composite index combining the index of electronic commerce impact with the indicator 14 related to the benefits of electronic procurement. However, we believe that at this stage it is worth leaving aside this process and concentrating on the impact of electronic commerce as such.

## 5. Summary

E-commerce in Europe is growing from the pioneer phase to increasing integration within people's lives and companies' normal business practices. The indicators required to monitor this evolution must have greater depth and articulation than those previously used to measure the start-up and early take-off of the phenomenon. As a result, project SIBIS proposes a number of existing and a number of novel approaches to capture this phenomenon.

The OECD conceptual framework employed by SIBIS to assess indicators, segmented in "readiness", "intensity" and "impacts" appears to have proved useful. Readiness indicators are mostly available (see appendix for existing studies), even if they may benefit from greater cross analysis. It appears though that the main gaps are evident in the measurement of intensity and impacts of e-commerce diffusion. This study has addressed a number of these issues.

An important consideration resulting from the proposed framework is that B2C e-commerce has progressed beyond the first stage of being perceived as a mainly technological innovation. B2C is now an alternative marketing and sales channel, and must be analysed as such. Similarly E-commerce is a major business innovation, which as a result may be combined into a number of business processes. As a result, available surveys on e-commerce have established that differences by sector and business size are more relevant than ICT diffusion patterns. But the analysis of e-commerce diffusion by sector is still limited and there is a lack of comparable data. For these reason SIBIS needs to develop effective indicators segmented by industrial sector activity. Also, a classification of enterprises, based on some sort of transaction type, carried out over the Internet by type of ICT services employ (essentially an e-commerce typology) may prove useful.

## 6. Appendix

### 6.1. Literature review

The existing theoretical approaches that aim at assessing electronic commerce from a quantitative perspective vary substantially across different studies and these differences are mainly attributable to the lack of a common definition. As Colecchia (2000) underlines, the issue is quite complex since not only different studies provide different definitions, but even among researchers who adopt similar conceptualisations, there are significant discrepancies as far as the statistical methodology is concerned, which result in very different estimates of Internet commerce volumes.

This chapter will first provide a critical overview of the alternative definitions of electronic commerce to be found in the literature and will then offer some relevant insights regarding the most important measurement questions arising from the on-line commercial transactions. It is important to stress that the focus of the SIBIS project in the e-commerce area is on electronic commerce involving both business-to-business and business-to-consumer transactions: accordingly, this review will deal with general issues on the topic involving different types of electronic commerce.

### 6.2. Definition of E-commerce

The need for reliable and comparable statistics that measure the level, growth and composition of electronic commerce stems from the interest in the way electronic commerce affects the economy as a whole, and in particular specific industries and sectors, firms and consumers. In particular, the literature is directed at developing empirical analyses that capture the emergence of new business models, changes in the business and public value-added chain, and the extent to which the electronic commerce diffuses across society, sectors and countries. In order to perform such research exercises, the first step is to define the object of measurement. Here the literature appears to be quite heterogeneous.

Electronic commerce could be defined as "any form of business transaction in whereby the parties interact electronically rather than by physical contact". However, this definition does not accurately encapsulate the essence of the electronic commerce, which can be better viewed as a case in which changing market needs and new technologies interact to change - sometimes fundamentally - the way in which business is conducted. Electronic commerce supports the continuously evolving business environment on a global scale: it can allow firms to be more efficient and flexible in their internal operations, to work more closely with their suppliers, and to be more responsive to the needs and expectations of their customers. For example, via the Internet, companies are often able to select the best suppliers regardless of their geographical location and to sell their products and services to a global market.

Due to the high degree of interactivity that characterises its underlying technology, the Internet allows the potential performance of a wide range of commercial activities and information exchanges. For instance, it offers firms, individuals and governments an electronic infrastructure that enables the creation of virtual auction markets for goods and services where previously they did not exist. EBay.com, for example, provides a business framework whereby consumers as well

as businesses can trade a wide diversity of goods and services with each other (consumer-to-consumer and business-to-business). Other examples of electronic commerce include internal transactions within a single company or provision of information to an external organisation without charge. Furthermore, in some countries governments are beginning to reorganise the management of public procurement systems over the Internet, opening the prospect of relevant business-to-government transactions. The technology is also being used by governments for the delivery of public services (government-to-business and government-to-consumer electronic commerce), in order to improve the convenience of the public in interacting with government, and to reduce the costs of payment systems, and by businesses to manage after sales services and to develop direct consumer marketing (Coppel, 2000).

Within the general and broad definition of electronic commerce, one special case is electronic trading, whereby a supplier provides goods or services to a customer in return for payment. For purposes of definition, a distinction should be made between the electronic trading of physical goods and services, and the electronic trading of information-based contents that can be directly delivered through the network. The first represents just an evolution of the existing ways of trading and relies upon the exploitation of new opportunities deriving from the emergence of new technologies to improve the efficiency in terms of lower costs, and to increase the effectiveness in terms of widening market potential and satisfying customers' needs, as well as providing a way to enhance product and service innovation through the strong interaction between customers and suppliers. The second constitutes a truly revolutionary way of trading, whereby the entire commercial transaction cycle is carried out simultaneously over the same network, since the content of the goods or services involved can be electronically reproduced over the Internet. This means that specific requirements are called for, especially as far as the proper integration of the payment phase and the protection of intellectual property rights are concerned.

In order to provide a comprehensive view of the electronic commerce, one can identify four main categories of on-line commercial transactions. The first is business-to-business electronic commerce, which refers to a firm that uses an Internet network to deal with its suppliers in order to receive invoices and make payments. Business-to-business electronic commerce concerns not only the transaction of good and services among companies, but also the management of various functions within a firm - from planning to marketing design and inventory control, from sales forecasting to ordering. Due to the extensive variety of activities involved, it is possible to further split this category of electronic commerce into *end-use electronic commerce*, which refers to on-line transactions entailing firms as end users, and *process electronic commerce*, which concerns various phases in the value chain other than transactions. Although potentially business-to-business electronic commerce generates the highest benefit for the entire value chain of a business, it is important to remember that more simple forms of business-to-business electronic commerce have been well-established for several years, particularly electronic data interchange (EDI) over private networks. The second category of electronic commerce is business-to-consumer, which can be assimilated to electronic retailing: this category has emerged and greatly expanded with the advent of the World Wide Web that allows consumers to have access to a broad range of information, products and services on-line. The third category represents business-to-administration electronic commerce and covers all transactions that offer the option of electronic interchange for such transactions as VAT returns and the payment of corporate taxes. This category includes also the electronic procurement of goods and services by public organisations and government organisations for their internal functioning. Finally, there is a fourth category that has not yet emerged, consumer-to-administration electronic commerce, whereby governments may extend the electronic interaction to such areas as welfare payments and tax returns. However

the present research will not include any reference to this type of electronic commerce, in order to avoid the provision of an excessively wide and possibly misleading definition.

A good starting point for the development of a definition of electronic commerce is to remember that a broad range of activities can be included. The core scope of the electronic commerce is addressing the commercial transaction cycle, which involves any form of electronic trading of physical goods and services and of electronic material, as well as the advertising and promotion of products and services, the facilitation of contacts between traders, the provision of market intelligence, pre and post sales support, electronic procurement and support for shared business processes. In this respect it is possible to identify five different phases in the electronic commerce process: gathering of information, placing an order/purchasing, delivery, payment, customer support. With particular reference to the business-to-business electronic commerce, it is important to underline that the group of firms involved in the provision and use of services is quite heterogeneous. There are companies that sell products and services on-line, suppliers of support services for the electronic commerce activity - i.e. Internet service providers, producers of platforms and technical solutions, managers of electronic marketplaces - and providers of solutions for payments and for the safety of the transactions performed on-line - i.e. banks, trusted third parties and other intermediaries. Finally, one has to bear in mind that not only firms and consumers, but also regulatory institutions play a significant role in shaping the speed and pattern of diffusion of the electronic commerce, by acting on related issues such as trust and safety, and intellectual property rights.

In this context, we will follow the approach of the OECD, which formed an Expert Group on Defining and Measuring E-commerce, with the aim of compiling definitions of electronic commerce that are policy relevant and statistically feasible. In April 2000, the OECD approved two definitions of electronic transactions, based on a narrower and broader definition of the *communications infrastructure* and a core list of indicators to measure electronic commerce use and transactions in businesses and households. **Narrow definition:** an Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments and other public or private organisations, conducted over the Internet. The goods and services are ordered over the Internet, but the payment and ultimate delivery of the good or service may be conducted on or off-line. **Broad definition:** an electronic transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments and other public or private organisations, conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off line.

### 6.3. The measurement of the electronic commerce: main issues from the literature

When dealing with the issue of defining electronic commerce, researchers follow quite different approaches. Some authors take into account all the financial and commercial transactions that occur electronically and not necessarily over the web (including EDI, electronic funds transfers and all the activity related to credit/debit card payments); others consider just retail sales to consumers for which the transaction and payment occur over an open network like the Internet. However, in order to develop an appropriate and coherent measurement framework, it is necessary to reach a common agreement on the definition of the electronic commerce to be utilised. First, in the process

of conceptualising the electronic commerce, one has to take into account two fundamental components: the activity that is performed and the communication infrastructure that supports this activity. The activity identifies the type of transaction carried out, for example ordering or delivery, while the communication infrastructure consists of two dimensions: the applications – such as the Web, EDI, Minitel - and the networks – open, close, proprietary and non proprietary. The existence of heterogeneous definitions of the electronic commerce derive from the consideration of different types of activities placed over different types of infrastructure.

An important issue, in this respect, concerns the relationship between the technology and the business processes that underlie electronic commerce. In particular, one could state that the most important impacts of the electronic commerce relate to the changes in firms' internal and external organisation that are necessary in order to develop on-line activities and to fully benefit from them. However it is worth remembering that it is precisely the interplay between the technology and the business processes that identifies the revolutionary nature of the electronic commerce. The simple electronic interchange of data and information has been existing for many years, well before the advent of the Internet, and has brought about important progresses in the management of business processes. Nonetheless it is just with the emergence of the Internet that firms had the opportunity to bring radical transformations in their business practices and routines, driving important changes in the economic activities. This is due to the fact that the Internet represents a breakthrough in the evolutionary path of information and communication technologies and, as a consequence, the application of Internet-based technological solutions to the entire value chain of the business process, which underlies the electronic commerce, causes significant economic changes. In particular the availability of Internet-based applications for the performance of commercial and other firm-specific transactions allows the development of innovative ways of making business and characterises the interface between different organisations and between firms and end users with a high degree of interactivity. If firms decide to consider these technologies only as an additional component of their existing ways of doing business, they will achieve only limited benefits. The most significant gains will occur to those firms that are willing to change their organisation and business processes to fully exploit the opportunities offered by the electronic commerce.

An interesting work by Haltiwanger and Jarmin (1999) clearly states that, before dealing with questions related to the digital economy itself, there is the need for a continuous and better measurement of many traditional "phenomena", in order to fully understand the impact of new technologies on the economy as a whole. This means that any attempt to appraise the digital economy should include finding better ways to measure the activities of firms in the "unmeasured" sectors and improving the quality of data and statistics for the measured sectors. In this context, the evaluation of the output of the service sectors appears to be fundamental in order to illustrate the impact of ICT. An important area of research and policy interest is the impact of IT on productivity, which has been the object of a great debate in recent years (for a review see Brynolfsson and Yang, 1996). The attention is not only on the measurement of computers and IT on productivity within organisations, but also on the assessment of measurable increases in productivity related to possible improvements in information flows and reduced transactions costs across organisations that perform electronic commerce. In particular, it is interesting to see if electronic commerce is associated with productivity gains in firms that carry out on-line commercial transactions on a continuous basis versus those that employ electronic commerce less extensively.

Another relevant issue related to the electronic commerce is the impact of IT on the way production is organised: researchers are interested in analysing how the electronic commerce has changed firms and industries and has modified the way in which buyers and sellers interact with each other. On the one hand, the ubiquitous availability of computer hardware and software significantly reduces the costs of setting up an electronic business, regardless of location and this allows also small firms to gain advantages from the technological opportunities. On the other hand, the Internet is giving consumers more power in the marketplace by making information on the available offerings more accessible. Both these phenomena are likely to bring substantial changes in the market structure and competition concerning a wide range of goods and services. In this respect, the assessment of electronic commerce should also take into account the degree of substitution occurring between goods and services purchased via electronic commerce and similar goods purchased through traditional channels. According to these framework, the authors believe that there is the need for data in five areas: measures of the IT infrastructure, measures of the electronic commerce, measures of firm and industry organisation, demographic and labour market characteristics of individual using IT and price behaviour.

Another important theoretical contribution concerning the definition and measurement of electronic commerce is the one provided by University of Texas Centre for Research in Electronic Commerce (1999), which represents a conceptual framework for the Internet Economy as a whole. According to this framework, the Internet Economy can be thought as a set of IP based networks, software applications and human resources that make the networks and applications work together for the implementation of an on-line business, and external agents who perform commercial transactions, by purchasing and selling products and services. Along this line, the authors conceptualise the Internet Economy into two broad categories: *infrastructure* and *economic activity*. The first one includes two further layers: the *Internet infrastructure layer*, which constitutes the physical infrastructure for the electronic commerce, and the *Internet applications layer*, which encompasses software applications, consulting, training and integration services that allow firms to implement on-line commercial transactions. The economic activity category is also subdivided into two layers: the *intermediaries level*, which concerns the role of third parties in a set of market support activities - provision of expertise or certification, search and retrieval services etc.; and the *on-line transactions level*, which regards actual transactions between buyers and sellers such as manufacturers and e-tailers.

For the purpose of the present paper, the most interesting issue of this study is represented by the examination of the on-line transactions layer, which, according to the authors, involves companies that generate product and service sales to consumers or businesses over the Internet. In order to measure the magnitude and intensity of electronic commerce, the paper advocates the superiority of an estimation oriented to the seller-side vs. an appraisal directed at the buyer-side, since the former has some pragmatic advantages. The amount of money spent by a consumer/business on-line may vary widely across different types of consumers/businesses and this diversity coupled with a large variance in on-line spending may require stratification as well as large sample size. Furthermore, most buyers do not remember exactly how much they spent on the Internet during a given period of time. By contrast, sellers are more likely to recall how much revenues they are generating through on-line transactions, because their entire business is undergoing a profound metamorphosis. This implies that any research should concentrate on the revenues generated by sellers through on-line transactions or by selling IP related products and services, rather than to the amount of money spent by the end users. This perspective is valid if one wants to merely reach a set of quantitative indicators, but becomes somewhat limited if the purpose of the research is to measure the electronic commerce also from a qualitative perspective. In this respect it is worth

stressing that, when assessing the electronic commerce, it is necessary to take into account also the demand side of the market and to build indicators that are suitable for the evaluation of all the aspects related to the performance of on-line commerce. The study stresses quite wisely that it is important to distinguish between IP enabled technologies and those technologies being actually used for electronic commerce. In this respect, for the purpose of measuring the electronic commerce, the authors suggest to consider only those revenues stemming from IP-related products and services that are directly related to the performance of electronic commerce. This research is quite important also because it puts emphasis on the fact that, in order to be able to compare the Internet Economy (and electronic commerce in particular) with the physical economy, it is important to measure the total value-added stemming from the on-line commercial transactions: this is particularly challenging for brick-and-mortar companies that carry out an on-line business since it is quite difficult to distinguish between the revenues stemming from the electronic commerce and the revenues deriving from the off-line transactions.

If we look exclusively at electronic commerce without taking into account the overall Internet Economy, one possible approach that helps develop a measurement framework is to distinguish between electronic business and electronic commerce (see Mesenbourg, 1999 and 2000). Electronic business is any process that a business organisation undertakes over computer-mediated network channels. Examples of these processes are on-line purchasing, on-line sales, vendor-manager inventory, production design and control, on-line logistics, customer support, employee training and recruiting. Electronic commerce is any transaction conducted over computer-mediated network channels that transfers the ownership of or the rights to use goods and services. It is important to underline that an electronic commerce transaction is completed when an agreement is reached between the buyer and the seller on-line: this electronic agreement, and not the payment, is what characterises an electronic commerce transaction. This specification is quite relevant, since very often it is believed that the distinctive feature of the on-line commerce is the electronic transfer of money: this procedure has in fact been in place for ages (e.g. through the use of ATM), while it is the conclusion of contracts over the web that represents a radically innovative business practice.

Having illustrated the intrinsic complexity of defining electronic commerce, in order to develop an appropriate framework for the empirical assessment of the Internet-based commercial transactions it is crucial to decide what exactly is the object of measurement. Indeed the degree of measurability of electronic commerce differs remarkably according to the definition adopted: this is why it is necessary to decide *a priori* which activities – information gathering, payment method - performed over which type of electronic infrastructure one should include. In doing so, one has to bear in mind that some features of electronic commerce are simple extensions of information already available – e.g. value and volume of sales conducted on-line - while others such as the quality of the transactions and the type of business models adopted require the availability of information and data that are even more difficult to collect and involve a more challenging measurement process.

Usually the literature deals with two main research questions: what is the size of electronic commerce and what is the impact of electronic commerce on the economy. In order to assess the size of on-line commercial transactions, it is sufficient to focus on the electronic commerce business activity and transactions. On the contrary, if one is interested in measuring the impact of electronic commerce, there is the need for using a broader definition, which refers more generally to the emergence of an "e-sector". Going back to the above considerations, this would mean

encompassing in the definition also the infrastructure needed to carry out electronic commerce activities or transactions.

The most important dimensions of electronic commerce are its size and characteristics and how the on-line commercial transactions are distributed over firms, industries and countries. Atrostic *et al* (2000) underline that there are separate questions about electronic business processes, electronic commerce transactions and electronic business infrastructure. As far as electronic business processes are concerned, one might want to understand what kind of processes are used and, how pervasive the use is, what are the characteristics and the role of firms, organisations and human capital involved in the electronic business processes. With reference to electronic commerce transactions, the most important questions are related to their value in different industries and sectors, to the distinctive features of the economic agents taking part to the electronic commerce transactions, to the type of products and services purchased and sold on-line and to the characteristics of the demand (intermediate or final). Looking at the electronic business infrastructure, the most important issues concern its dimension and the size of its components, the amount of annual investments in electronic business capital, the distribution of these investments among the components of the electronic business capital, the rate of depreciation of the physical and human capital components of electronic business, and how the stock and the flow of investments vary by economic actor, industry, sector, and country.

More complicated and challenging than measuring the size of the electronic economy is assessing its impact on the overall economy: impact on variables such as productivity cannot be measured directly, but requires inferences developed through the application of analytical models to information concerning specific economic indicators. The impact of the electronic economy manifests itself both at the level of individual businesses and at the aggregate level. For consumers, the performance of electronic commerce transactions affects their off-line purchasing behaviour in terms of products/services purchased, time dedicated to shopping, costs and available income. For individual firms, the use of electronic business has a strong impact on what they purchase, what they produce, the way they produce it, their marketing and selling activities, and their productivity and profitability. In this respect, there is the need to understand how electronic business changes inventory, procurement and other supply chain practices, how it affects the boundaries of the business, e.g. through outsourcing or vertical integration, how the impact varies over time and across firms, regions and industries. It is important to underline that changes for individual businesses inevitably lead to significant transformations in the overall economy and affect a wide range of measures of economic performance such as economic growth, productivity, prices, employment and wage level, and international trade balances. Due to the widespread impact of electronic commerce at different levels, when dealing with its measurement, it is necessary to use both macro and micro data: this means, for example, that the size and the productivity of the electronic business should be measured both at the level of firms (micro level) and at the level of sectors (macro level).

A well-established framework to identify the most relevant indicators needed to evaluate the electronic commerce has been developed by Colecchia (2000). Colecchia's focus is on three aspects of electronic commerce at the country level: readiness, intensity and impact. Electronic commerce readiness refers to the basic conditions for using electronic commerce, i.e. existing ICT infrastructure and usage profiles within a specific country. This aspect can be assessed using indicators that signal the opportunity for and propensity (skills and training) of consumers, firms and governments to perform electronic commercial transactions. As far as infrastructure is concerned, the most common indicators include the penetration of fixed access lines, the rate of

diffusion of mobile telephones and the number of Internet hosts. In terms of opportunities for different economic actors, statistical agencies usually adopt indicators such as the number of Internet service providers and of telecommunications operators, the degree of competition in the market for telephone services, the availability of secure servers for electronic commerce, the Internet access baskets and telephony tariffs that allow comparisons of Internet access prices across different countries. With reference to the propensity of consumers to carry out electronic commercial transactions, one would ideally want to gather qualitative indicators related to the perceived obstacles and benefits of the electronic commerce, and quantitative measures such as the number of people with computer skills and the average expenditure on electronic commerce.

Statistical sources available so far tend to focus on the readiness indicators and, in particular, on the development of business-to-consumer electronic commerce: socio-economic user profiles, ICT equipment in private households, types of use of the Internet and, in some cases, barriers preventing the diffusion of the Internet and electronic commerce. Similarly, also the readiness indicators on business-to-business electronic commerce are well covered in the existing literature, which puts a strong emphasis on the number of enterprises offering business-to-business solutions, the business branches in which they are active and, in most cases, the use of advanced ICT within enterprises. In some cases it is also possible to find data concerning business functions usually supported electronically, as well as information regarding barriers preventing businesses from using business-to-business applications.

The electronic commerce intensity identifies the dimension, growth and main features of the electronic commerce and can be evaluated by using indicators related to the type of components (e.g. payment), business functions, actors, products and services involved in the on-line commercial transactions, and if these transactions are regional, national or international. Collecting information on these features is quite challenging: the data needed refer to the intensity and frequency of Internet use, the expectations of using the Internet, the type, diffusion and value of Internet transactions, which requires the use of qualitative surveys and the successive elaboration of the information gathered. Within this area, the priorities have so far been related to the business enterprises and to the households: as far as the former is concerned, there have been several surveys aiming at measuring the diffusion and use of information and communications technology (particularly the Internet); as far as the latter is concerned, most countries have developed surveys related to the electronic commerce intensity as part of more general household surveys programmes. The assessment of electronic commerce intensity by means of surveys poses important challenges and might generate problems of comparability between different countries, due to the fact that these surveys are usually country-specific and questionnaires are not uniform across different geographical regions. The performance of surveys appears to be even more problematic when such surveys have the objective of assessing the value of electronic transactions, mostly because the number of people and business that carry out such transactions is quite small.

In general the area of intensity indicators is covered only partly in the existing documents: there is still limited information on the purchasing behaviour of consumers and on enterprises selling goods on-line. The available studies include data concerning methods of delivery, methods of payment, after sales services offered and number of transactions concluded on-line. Similarly, statistics on investments in ICT equipment by firms, on expenditures in advertising and on the geographic dimension of business-to-business are quite scarce. The same applies to business-to-business intensity indicators on the demand side: there are a lack of data regarding the volume of on-line transactions performed by firms and on the way these transactions are carried out.

Similar difficulties are involved in the assessment of the electronic commerce impact, which concerns the value-added generated by the electronic commerce and its effects on the production processes and business models, as well as on the socio-economic environment as a whole. The ultimate goal is to have a set of indicators that refer to the effects of on-line business on firms' performance and the ex-post perceived obstacles and benefits of the electronic commerce for all the agents involved. In order to do so, there is the need for monitoring and evaluating on a constant basis changes in the marketplace, the emergence of new business models and the need for new skills and new organisational forms. Indicators in this research area are quite scarce, as far as both the consumer side and the business side is concerned. Data on customer satisfaction in terms of saving of time and money, willingness to purchase on-line and use of the Internet for other activities are quite rare. The same applies to the analysis of the impact of business-to-business on firms' internal organisation, which requires information on the substitution of business processes and value added regarding management. The scarce availability of indicators concerning the intensity and impact of electronic commerce partly reflects the embryonic nature of electronic commerce markets in most countries, as well as the difficulty of identifying appropriate measures. In this context, case studies of firms that are engaged in electronic commerce more than general surveys on sectors appear to be more appropriate to assess the potential impacts of electronic commerce and the similarities and differences at the sector and country level.

In general, it is reasonable to argue that indicators used to measure the diffusion or impact of ICT and electronic commerce are often based upon assessment criteria that have been developed for industry structures that do not exist any longer. For this reason they may not properly represent the changes that take place following the emergence of the digital economy. In this respect, a Dutch policy document "Measuring the e-commerce - Recommendation for a Dutch e-commerce monitor" (see below) provides useful guidelines for the development of an appropriate methodology for the monitoring of electronic commerce. According to this document, once a set of readiness, intensity and impact indicators will be available, the next step should be to focus on more complex aspects such as changes in the position of a company in the value chain, cost structures, savings made in businesses and consequences for firms, effects on taxation. The statistical representation of business-to-business electronic commerce has to be re-organised according to the distinction between "end-use e-commerce" and "process e-commerce". In particular, there is the need for data that distinguish between the active provision of e-commerce facilities, with specific attention to the co-ordination of back and front office processes, and the passive role of companies as users of business-to-business services. Future analysis should concentrate on providing insights on the rate of adoption of e-commerce, the implementation of on-line business processes, and the changes brought about to the organisation of production.

## 6.4. Overview: Policy Documents on Electronic Commerce

The growing importance of electronic commerce across the world and its increasing impact on the overall economy have stimulated working groups of the European Commission and Member State governments to develop a series of policy documents that face various issues related to the emergence of on-line commercial transactions. Most of these documents refer to electronic commerce readiness more than to electronic commerce intensity and impact, which reflects the current status of electronic commerce in most countries and the main concerns of the policy actors related to this topic. The table below provides an overview on the main policy documents issued both at the European and at the national level. These documents will be described more in depth in the next sections.

Title of document	Region	Publication date	Type of document
The Economic and Social Impact of Electronic Commerce	OECD	1999	Evaluation
Information Technology Outlook	OECD	Latest 2000	Report
Communications Outlook	OECD	Latest 2001	Report
Measuring the ICT sector	OECD	2000	
E-Commerce for Development: Prospects and Policy Issues	OECD	2000	Report
E-Commerce: Impact and Policy Challenges	OECD	2000	Evaluation
A Quantitative Assessment of Electronic Commerce	WTO	1999	Evaluation
The Creation of the .eu Internet Top Level Domain	EU	2000	Documentation
Helping SMEs to Go Digital	EU	2001	Action Plan
Basic Facts and Indicators. E-Commerce Market Overview	EU	2001	Report
Clarification on the Application of the Permanent Establishment Definition in e-Commerce: Changes to the Commentary on the Model Tax Convention on Article 5	OECD	2000	Report
Tax Treaty Characterisation Issues Arising from E-Commerce	OECD	2001	Report
Consumption Tax Aspects of Electronic Commerce	OECD	2001	Report
Tax Administration Aspects of Electronic Commerce: Responding to the Challenges and Opportunities	OECD	2001	Report
Digital Economy 2000	US	Latest 2000	Report
Electronic Commerce Policy Guidelines	Italy	1998	Documentation/ Action Plan
Portuguese Initiative on Electronic Commerce	Portugal	1998	Action Plan
International Benchmarking Report 2000	UK	2000	Report
e-commerce@its.best.uk: A Performance and Innovation Unit Report	UK	1999	Report
Promoting Electronic Commerce	UK	1999	Draft Bill
Measuring e-commerce Recommendation for a Dutch E-commerce Monitor	Netherlands	1999	Evaluation
Status Quo and Development Prospects of Electronic Commerce in Germany, Europe and USA, with Special Consideration of its Use in Small and Medium Sized Businesses	Germany	2000	Evaluation/ Action Plan

## 6.5. Policy documents at the European level

This section provides an overview of the ten EU policy documents listed in the table above, presenting, for each document, a description of its content and main objectives, as well as an evaluation of the current status of the specific issues and, where possible, a list of indicators.

### ***The Economic and Social Impact of Electronic Commerce***

This report explores the social and economic impacts of electronic commerce and provides a preliminary analytical foundation for further work. It does not present an exhaustive analysis but seeks as much information as possible so as to provide policy makers with a quantitative picture, of the current state and likely future direction of electronic commerce. On this basis, policy makers can begin to outline the parameters of its impact and identify areas in need of future research. In the document, it is stressed that fundamental to any analytical work on electronic commerce is the ability to measure it accurately. To focus the policy debate, statistics that measure the level, growth, and composition of e-commerce are badly needed. Today, while nearly all sources indicate that business-to-business e-commerce dominates the market, most existing analysis and available data focus on the business-to-consumer segment. The document suggests that a statistical methodology and apparatus for measuring electronic commerce should be developed. Key areas for future research are the business-to-business segment; electronically delivered products such as software, travel services, entertainment and finance; and country-specific differences in the size and growth potential of electronic transactions.

The report addresses the above mentioned issues and offers important conclusions and research agenda for the future. A main reason for the rapid growth of electronic commerce, especially the business-to-business segment, is its significant impact on costs associated with inventories, sales execution, procurement and distribution, and with intangibles like banking. To fully reap the potential cost savings, firms must be willing to open up their internal systems to suppliers and customers. As firms integrate their operations more closely, issues of security and potential anti-competitive effects arise. More generally, e-commerce illuminates differences that may exist between products, industries and countries, thereby highlighting the need to reform inconsistent regulations. Therefore, it is stated that the economy-wide and sector-specific impact of e-commerce on productivity should be assessed, and the notion that this application may lead to a sustained higher level of economic efficiency should be explored.

E-commerce can dramatically reduce some production costs, but it does not offer a "friction-free" environment. Rather, owing to new costs associated with establishing trust and reducing inherent risks, it requires new intermediaries. Widespread "disintermediation" (producers selling directly to consumers without aid of intermediaries) is unlikely, but the nature of intermediary functions is likely to change. This means that monitoring of the restructuring of intermediary functions is needed. Cost reductions are not automatically translated into price reductions. They are contingent on sufficient competition. Electronic commerce will certainly change the structure, if not the level, of pricing as more products are subject to the differential pricing associated with customised products, fine market segmentation and auctions, and as the ease of changing prices increases. In this respect, the report remarks that sectoral studies on a variety of consumer and business products should be undertaken to measure the impact and identify factors that encourage and inhibit price competition, including the use of intelligent agents.

Finally, the impact of the structure of price setting and of the frequency of price changes on markets and on measurement also requires study. Electronic commerce is transforming the marketplace by changing firms' business models, by shaping relations among market actors, and by contributing to changes in market structure. Electronic commerce also changes firms' competitive advantages and the nature of firms' competition. Given the dynamic nature of these processes, the impact of electronic commerce will be firm, sector, and time-specific. The electronic marketplace needs to be continuously monitored. Case studies should address the sectoral and market specificity of organisational impacts. Ongoing assessment of potential new barriers to market entry are also needed.

### ***Information Technology Outlook***

Information technology (IT) is significantly affecting the economy, the growth and structure of output, occupations and employment and how people use their time. The Information Technology Outlook 2000 describes the rapid growth in the supply and demand for information technology goods and services and their role in the expanding Internet economy and looks at emerging uses of information technology. It reflects the spread and diversity of a technology that is underpinning economic and social transformation. It makes use of the new official national sources of data which are becoming available as statistical mapping of the information economy improves. With reference to the electronic commerce, the Information Technology Outlook 2000 addresses the following issues.

#### ***E-commerce readiness***

Rapid growth in the use of the Internet and the emergence of electronic commerce has the potential to transform economic and social activities, but this potential is just beginning to be realised. The diffusion of electronic commerce is likely to follow the usual S-curve for new and pervasive technologies. As the characteristics of electronic commerce evolve, the related policy concerns are likely to evolve as well. Three broad phases in the growth of e-commerce are defined: i) readiness: preparing the technical, commercial and social infrastructure necessary to support e-commerce; ii) intensity: examining the current situation and identifying early adopters and laggards; iii) impact: addressing additionality and multiplier effects and the effect of electronic commerce on the efficiency of economies and the creation of new wealth. These phases are measured with different types of indicators. The main indicators of electronic commerce readiness are network infrastructure, technology diffusion, and skills and human resources. The discussion of electronic commerce "readiness" focuses on the current and potential use of ICTs for online commercial transactions. Emphasis is placed on the combination of PCs and TCP/IP technologies, which are often the extension of or complement to established and widespread Electronic Data Interchange (EDI) systems.

One factor seen as inhibiting the uptake and use of IT and electronic commerce is the widely held idea that an IT worker shortage has developed. For the United States, the major IT market and supplier, data on unemployment rates, wages and graduates suggest that there is no conclusive evidence of a serious shortage of IT workers. However, the structure of available skills may be a concern, and governments are likely to need to foster acquisition of the necessary IT skills. Moreover, there is concern about what appears to be an important and growing digital divide within and between countries. Within countries, access to IT and network resources varies widely; income, education, age, and household type are determining factors, and, to the extent that they may inhibit use of IT and networks, they will also slow the diffusion of electronic commerce.

Attention is being focused on other roads to the "Information Highway", including local educational and information routes such as schools, libraries and community access centres.

### *Issues in electronic settlements*

Information technology is becoming ubiquitous in electronic payment. Trust is the most important issue for extending the use of electronic settlements. Trust is needed at many levels, including hardware and software security, the regulatory regime, familiarity and users' perceptions. Factors affecting the level of trust required and provided include: i) where and how payment takes place (whether real or virtual - for virtual settlement, data circulated over the network are recognised as having monetary value or contain payment instructions); ii) when settlement takes place (prior to, at the time of, or after the transaction); iii) who settles (established incumbents or new entrants); iv) whether the transaction is business-to-business or business-to-consumer; and v) whether settlement can be traced. There are a number of policy issues related to trust in methods of electronic payment. Bandwidth (to ensure security and rapid operation), hardware and user security, and logical security (passwords, PINs, etc.) help make electronic payment more trustworthy and usable. Furthermore, issues of certification and authentication, encryption, privacy, liability and consumer protection, financial regulation and market development and competition all affect whether electronic settlement is acceptable to users.

### *Policies to promote electronic financial transactions*

IT policies relevant to electronic financial transactions generally emphasise technology diffusion as a complement to private-sector technology development. These policies often take the form of government-led test-bed projects or government use of new technologies. Through such efforts, governments can help familiarise users with new technologies and increase the level of perceived trust. Government use of technologies may also help demonstrate that they are functional and trustworthy. Examples of government-led projects include test beds in co-operation with the private sector in Japan [electronic money (Internet Cash) and integrated circuit (IC) cards to test electronic transaction options], various electronic payment projects in Europe, and government-sponsored smart-card pilots for the United States military. All OECD governments are increasing their use of online transactions to demonstrate the viability of such processes to improve the efficiency of government services. Among other examples, the US electronic fund transfer (EFT99) requires most federal payments except tax refunds to be made electronically from January 1999. Other governments also have started to use electronic financial transactions to settle and receive payments, mainly for tax collection but also for payment of government services.

The regulatory environment also affects the development and use of electronic payment. Existing regulations in areas such as certification and authentication, privacy, liability and consumer protection, as well as in financial services regulations, may be inadequate to promote trust in electronic payment. Some governments have started to tackle these policy issues: for example, new regulations on electronic banking in the United States, proposed legislation in Japan and the EC recommendation on electronic payment instruments. The experience with government policies to promote electronic financial transactions clearly indicates the importance of encouraging diffusion by testing a variety of technological solutions and using them for government business to demonstrate their reliability and trustworthiness. Technology development is primarily led by the private sector. Governments nonetheless have an important policy role in ensuring competition to develop new and improved technologies and solutions and in encouraging interoperability among competing standards. The legal/regulatory framework for electronic financial transactions needs

to be technology-neutral and provide a stable, forward-looking framework for developing payment systems.

### **Communications Outlook**

The 2001 Communications Outlook presents the most recent comparable data on the performance of the communication sector in OECD countries and on their policy frameworks. The data provided in this report map the first two years of competition for many OECD countries that fully opened their market to competition in 1998. The 2001 edition analyses major changes and trends in the communications sector and explores future developments. The OECD Communications Outlook provides an extensive range of indicators for the development of different communications networks and compares performance indicators, such as revenue, investment, employment and prices for service throughout the OECD area. These indicators are essential for industry and for regulators who use benchmarking to evaluate policy performance. This book is based on the data from the Telecommunications Database 2001 which provides time series of telecommunications and economic indicators, such as network dimension, revenues, investment and employment for OECD countries from 1980 to 1999.

### **Measuring the ICT sector**

*Measuring the ICT Sector* has been prepared by the OECD Secretariat under the guidance of the Working Party on Indicators for the Information Society (WPIIS) and the Working Party on the Information Economy (WPIE). It aims at providing a set of statistics drawn from official sources that measure the output of the ICT sector in a consistent manner and that adheres to a common international definition agreed to by the OECD Committee for Information, Computer and Communications Policy (ICCP) in September 1998. As the statistics are based on this common definition they achieve a greater level of international comparability than has previously been possible. For the same reason, they will differ from the statistics published by individual Member countries. In addition, the combination of statistics from the services, manufacturing and telecommunications sectors has involved compiling figures that are not always perfectly compatible. The statistics should therefore be seen as approximate and should be used with a recognition of their limitations. The publication contains two main sections. The first contains comparisons for selected indicators across OECD Member countries. The second part provides more comprehensive profiles for individual Member countries. Many different data sources and approximations have been used and, over time, it is expected that more comparable data will become available. In future years, it is hoped to include a greater range of industry and country data, statistics about the products produced by the ICT sector and the use of these products in various parts of the economy.

### **E-Commerce for Development: Prospects and Policy Issues**

This report was published by the OECD and identified the need to overcome infrastructural constraints in telecommunication, transport and logistics as one of the key policy challenge. It aims at identifying the benefits of the Internet and cellular telephony to low-income countries and at identifying the main indicators involved in the digital divide. The Internet is seen as having beneficial impacts on the economies, due to the increase in price transparency and competition, and to the exposition of firms to an intense global competition, which increases the efficiency of governments and businesses. With respect to legal and regulatory issues, capacity building via Official Development Assistance can assist the participation of developing countries in

negotiations and discussions that are shaping global rules and protocols governing the e-commerce. Finally "thinking outside the envelope" is needed with the Official Development Assistance, just as it is with private ventures in this age of e-novation. There may be, for example, scope for initiatives targeted specifically at small entrepreneurs in poor countries, as with support for their individual or collective participation in Web-based on-line rating schemes or with publicly-sponsored portals for small producers' wares to overcome barriers to trust.

The report is a general discussion on the specific benefits of electronic commerce for poorer countries and regions, and the following points were identified as Policy Requirements for accelerated electronic commerce development:

- Legal norms and standards;
- Process and technical standards;
- Weaving the web of trust (the problem of trust is being addressed through private sector innovation);
- Special care needs to be exercised to ensure that any policy developed for one interest or function does not impact unduly on, or interfere with, other interests or functions;
- Tax treatment (i.e. whether electronic commerce transactions can be taxed and, if so, at what rate); and also into what jurisdiction international electronic commerce transactions fall. Governments of poorer countries may wish to take a liberal approach to taxation of electronic commerce transactions because some important items available on the Web (e.g. software) are essentially investment goods whose taxation would be counterproductive and because any tax would raise the incentive to piracy.

### ***E-commerce: Impacts and Policy Challenges - Economics Department Working Paper No. 252***

This paper was published by the OECD in 2000 and it assesses the potential outcomes and economic impacts of the electronic commerce in the business-to-business and business-to-consumer areas, the forces underlying its expansions and the possible implications for structural and macroeconomic policy management. In order to fully exploit the opportunities for electronic commerce, much remains to be done to increase user and consumer trust, to improve access to the Internet infrastructure and services and to create a stable and predictable regulatory environment. The consequences of policy reform can only be speculated at because of the recent advent of the Internet. It defines the electronic commerce and states various methods of measuring its success. The core essence of the report is the "economic impacts and prospective policy challenges of e-commerce" and in particular: the impact on prices, the impact on competition and competition policy, tax, trade policy and regulatory issues, employment and labour market policy, economic performance and macroeconomic policy. In this paper, the following indicators are used: number of Internet hosts, number of secure servers, number of web users, number of web sites, number of new domain name registrations.

### ***A quantitative Assessment of Electronic Commerce***

This paper was issued in September 1999 by the WTO and tries to assess quantitatively the role of electronic commerce in the economic activity and in trade and tariff revenue collection. It aims at identifying the advantages, disadvantages and impact of electronic commerce on different world economies and at identifying the impacts of a "duty-free cyberspace" of revenue losses arising from the substitution effect. Despite the growing importance of electronic commerce for economic

activity and trade, tariff revenue loss from electronic commerce is likely to be minimal. Due to the fact that the Internet has been around for such a short period of time, a lack of adequate data on the magnitude and relevance of electronic supply has made policy-making decisions all the more difficult. This report focuses on the delivery of the goods purchased electronically. The conclusions drawn by the report are that even if all the delivery of digitisable media products moved on-line (a quite remote prospect), the revenue loss would be minimal except for China and Hungary, i.e. the revenue loss from "duty-free cyberspace" would be a very small share of total government revenue.

### ***The Creation of the .eu Internet Top Level Domain (Working Paper)***

This paper argues that the creation of the .eu Internet domain would strengthen the image and infrastructure of the Internet in Europe, for the purposes of the European Institutions, private users and for commercial scopes including electronic commerce. Questions are raised about the .EU Registry's registration policies, how they should be developed and implemented, and by whom. The Internet Domain Name System is an important component in the identification and location of Internet users, and despite the rapid growth of the Internet and several years' policy discussions, the system has not been expanded or developed consistently. The document remains very shallow on developing the themes of policy implications of the .EU top level domain name and on its effects on the electronic commerce.

### ***Helping SMEs to Go Digital***

This document gives a detailed account of the objectives of the SMEs "Go Digital" initiatives and includes a detailed abstract of each of the actions undertaken for those specific goals. The three priorities of the Go Digital initiatives are to promote a favourable environment and framework conditions for electronic business and entrepreneurship, to facilitate the take-up of the electronic business and to contribute to the provision of ICT skills. SMEs have a crucial position because they make up 99% of all enterprises and because they are potentially more flexible in their internal organisation than larger companies, they could therefore have less trouble adapting to changing market conditions more quickly and efficiently. A number of obstacles have been identified for SMEs, which relate to the current business climate - in particular the volatility of the dot com businesses; to the regulation concerning the participation of SMEs in e-business across borders; the lack of suitable technical and managerial human capital with sufficient ICT competencies; the complexity and lack of robustness of many ICT technological solutions and the lack of standards; the substantial costs faced by SMEs in the phases of preliminary planning, procuring hardware and/or software tools, continuous maintenance, servicing costs and telecommunications charges.

The main objectives of the paper are to identify the principal obstacles faced by SMEs as they engage in electronic business, to propose and benchmark specific strategies and actions to help SMEs "go digital", in particular by building on the existing policies and initiatives to ensure consistency among the various policies and initiatives to support SMEs go digital at the European, national, regional and local levels, and to learn from practical experience. In conclusion, the paper aims at identifying the specific needs of SMEs to fully reap the benefits of e-business and to present specific "Go Digital" initiatives to be implemented by the Commission. In particular, the document proposes 11 Actions that can be undertaken in close collaboration with Member States:

1. Benchmarking of national and regional strategies in support of the electronic business;
2. Measuring of take up of ICT and e-business;

3. Improve access to information and collect feedback for policy making purposes in the area of electronic commerce legislation;
4. Electronic business interoperability ;
5. Promoting the awareness of Going Digital - e.g. through the publication of a grant theme for the financial support for regional and sectoral events in support of Go Digital activities;
6. Electronic commerce take up;
7. Provision of a loan guarantee facility for SMEs;
8. Promoting better use of structural funds;
9. Supporting industry-led initiatives for new ICT curricula;
10. Creating an ICT skills monitoring group with member states;
11. Launching a SMEs trainee programme.

### **Basic Facts and Indicators. E-commerce Market Overview**

This report was published by EU-ISPO and gives some basic statistics on the electronic commerce market at the end of 1999. It is possible to distinguish four categories of countries with respect to the size and growth of electronic commerce:

- Countries with an electronic commerce market per 100 inhabitants ranging between 7000 and 9500 EUR: Nordic countries, the United Kingdom and the Netherlands
- Countries with an electronic commerce market per 100 inhabitants ranging between 6000 and 6900 EUR: Germany and Austria
- Intermediary countries such as Italy, France and Ireland with an electronic commerce market per 100 inhabitants ranging between 2000 and 4000 EUR
- Countries with a less advanced electronic commerce market per 100 inhabitants ranging between 100 and 1300 EUR: Spain, Belgium, Greece and Portugal.

Furthermore, the highest propensity to purchase on the Internet are found in the Nordic countries (Denmark, Finland and Sweden) and in the United Kingdom. Intermediary countries are Germany, Netherlands and France, then Ireland and Belgium. Electronic commerce propensity is very low in Portugal and Spain.

### **Clarification on the Application of the Permanent Establishment Definition in e-Commerce: Changes to the Commentary on the Model Tax Convention on Article 5**

This paper was issued by the OECD Committee on Fiscal Affairs in December 2000 and it contains clarification of the *Model Tax Convention* document on Article 5, which deals with the definition of what constitutes a permanent establishment in the electronic commerce context. This is of vital importance because it entails increased ability to apply the tax regulations to the electronic commerce area, which has been proved to be quite difficult. The following conclusions were reached:

- a web site cannot constitute a permanent establishment;
- no human intervention is required for a permanent establishment to exist;
- the issue of whether computer equipment at a given location constitutes a permanent establishment will depend upon whether the functions performed through the equipment exceed the preparatory or auxiliary threshold, which can only be decided on a case-by-case analysis.

The paper deals also with the issue of where the website is stored in terms of which server. Finally, the document concludes that computer equipment at a given location can constitute a permanent

establishment only if it meets the requirement of being fixed. Nothing is mentioned about the current status and next steps related to the topic.

### ***Tax Treaty Characterisation Issues Arising from E-Commerce***

This report was issued by the OECD Technical Advisory Group on Treaty Characterisation of E-commerce payments and is the result of a continuous work of the group aiming at identifying typical electronic commerce transactions and analysing the various treaty characterisation issues that could arise from these. The document advocates the need for addressing each issue separately. Both business-to-business and business-to-consumer transactions are included, without making any distinction between the two. The main issues examined are the following:

- Business profits and royalties - particular attention is given to the distinction between them and to the identification of the consideration for the payment;
- Business Profits and Know-how - the issue here is to distinguish whether the consideration for a payment is the provision of services or the provision of know-how and this is especially relevant in the context of differing between payments for services and payments for the provision of know-how;
- Payment for digital products;
- Technical fees;
- Mixed payments.

The main objectives of the Technical Advisory Group are to examine the characterisation of various types of electronic commerce payments under tax conventions with a view to provide the necessary clarifications, and to identify the typical electronic commerce transactions and analyse the various treaty characterisation issues that could arise from these. Again no mention is given of the current status and next steps.

### ***Consumption Tax Aspects of Electronic Commerce***

This paper was issued by the OECD in February 2001 and concludes two years of work by the Working Party #9 on the issue of consumption in electronic commerce. It sets out the guidelines on the definition of the place of consumption, which involves defining the principle of taxation in the place of consumption more clearly and identifying the collection mechanisms that can support the practical operation of that principle. The report also provides a few recommendations on the possible options related to the collection mechanism, which is developed in the form of registration-based or self-assessment for business-to-business transactions. Other points involved in the discussion of this report are: tax at source and transfer, collection by third parties, technology-based and/or technology-facilitated options, and the simplified interim approach. Only the national as opposed to sub-national tax regimes have been included in the report. As far as the place of consumption is concerned, services will be broadly categorised as those that are either *tangible* (the place of consumption can be readily identified) or *intangible* (the place of consumption is uncertain). In conclusion, for business-to-business transactions it is considered that the place where the product is supplied is the place of consumption, whereas for business-to-consumer transactions, the place of consumption is the place where the consumer has his/her usual place of residence.

The taxation framework conditions concludes that the consumption tax rules for cross-border electronic commerce trade should result in taxation in the jurisdiction in which the consumption

takes place. The report was endorsed and approved for publication for a period of public comment. The upcoming months will see the report take shape and will be presented to the Commission for Fiscal Affairs with specific guidelines. The Working Party made eight recommendations related to future research to be carried out, which involve the means of verifying the declared jurisdiction of residence in business-to-business transactions, the means of verifying the status of the recipients, the role of registration thresholds, the relative feasibility of technology-based collection mechanisms, practical measures to promote international administrative co-operation, simplification options and initiatives, compliance-related issues, the longer-term possibility of the expansion of technology-based mechanisms.

### ***Tax Administration Aspects of Electronic Commerce: Responding to the Challenges and Opportunities***

The report was issued by OECD in February 2001 and offers a brief recapitulation of the issues and conclusions raised at the Ottawa Conference - tax regulations should have the following characteristics: neutrality, efficiency, certainty and simplicity, effectiveness and fairness, and flexibility. The summary of the conclusions of this report are as follows:

- Implement the Taxation Framework Conditions in relation to taxpayer services;
- Facilitate the exchange of practices and knowledge between administrations;
- Assist SMEs to attain and maintain compliance;
- Examine the options to implement the Taxation Framework Conditions in relation to tax administration and compliance;
- Create a Technology Panel to provide standard setting bodies in a timely manner;
- Create a new Technical Advisory Group that expands the issue coverage of business taxation administration;
- Pursue other activities to increase the awareness of the issues associated with taxation of electronic commerce with non-member states;
- Include some key non-member states into a sub-group

The objectives of the paper are to encourage greater cooperation by revenue authorities on a global scale and to attain a much deeper understanding of the implications, for the revenue authorities, of the borderless electronic commerce. The document was endorsed by the Committee of Fiscal Affairs and was approved for publication. Three main strategic strands of future work are a better understanding of the electronic commerce environment, an improvement of tax payer services and the progressing of the Ottawa Taxation Framework Conditions.

## 6.6. Policy documents at the member state level

This section provides a textual overview of the main national policy documents in the area of electronic commerce, concentrating on the identification of the most relevant issues for each country.

### ***The Digital Economy 2000 (US)***

This is the third annual report from the Commerce Department on the digital economy. The first two reports were entitled, *The Emerging Digital Economy (I and II)*. This third edition has a new title, because the digital economy and digital society are no longer "emerging". This report, like its two predecessors, measures the economic performance of information technology (IT) industries and their substantial impact on growth and inflation, and sketches the emerging dimensions of e-commerce. In particular, the chapter on electronic commerce sheds light on the role of consumers and businesses in the in the new economy. The first part focuses on business-to-consumer electronic commerce, analysing issues such as the practices related to online pricing, the availability of electronic information, the emergence of on-line communities. The second part concentrates on business-to-business electronic commerce and focuses on the transformation of the market place, on the development of on-line market places, on the characteristics of e-business processes. The report puts a lot of emphasis on the need for better measures of the impact of IT on productivity and advocates the use of a new statistical framework for the assessment of the output in some key IT-intensive service sectors. In particular, it states that in the absence of more accurate measures of output for IT-intensive services industries, it is not possible to rule out the possibility that IT has made a very modest contribution to labour productivity outside the IT producing sector itself. With better measures of output for individual service industries' output, it might be learnt that IT has strongly contributed to service industry productivity or, conversely, that IT has not contributed as much to overall labour productivity improvement as technical change outside of IT, including organisational change.

### ***Electronic Commerce Policy Guidelines (Italy)***

This report was issued in 1998 by the Ministry of Industry, Commerce and Handicraft and gives a comprehensive overview of the Italian electronic commerce status in 1998. It includes a synoptic table of the interventions, which can be summarised as follows:

- Develop the payment system and new on-line applications (banking and postal) and promote the electronic currency;
- Facilitate the relationships of the enterprises and the citizens with the public administrations also through the diffused use of ICT applications (authorisations, certifications, declarations, purchases, tenders, competitions) and of the services offered on the network;
- Diffuse new electronic commerce processes and create new entrepreneurial activities;
- Progressive reduction of the costs of the telecommunications services due to the new regime of competition in the sector;
- Adapt the commercial rules and regulations;
- Define a non-penalising tax treatment and establish measures that facilitate the fulfilment required by the electronic means;
- Start adequate training programs that also include forms of tele-teaching that are possible with the new technologies.

The report identifies also a series of electronic commerce initiatives, which can be summarised as follows:

- Establishment of the Permanent Observatory for Electronic Commerce and of its related Technical Secretary's Office;
- Annual Report by the Minister of Industry on the diffusion of electronic commerce;
- Revision and update of the guidelines;
- Road map of the initiatives and of the activities at the national, European and international level on the electronic commerce;
- Pre-arrangement of a "Unique Text for the Electronic Commerce";
- Establishment of a committee for the electronic commerce sites;
- Public administration on-line procedures and transactions;
- Revision of rules – best practices;
- Credit of the Certification Authorities - public and private subjects that comply with the requirements of the law;
- New approach for the assignment of domain names on Internet;
- Legislative decrees established by the Act 676/96 to regulate the aspects of privacy connected to the treatment of data by electronic means;
- Definition of taxation and customs aspects;
- Creation of the requirements for competition on the basis of equal conditions of access;
- Abolition of the obstacles created by fees to the discussion of the electronic commerce;
- Support of the Italian representatives at the level of EU, G8, OECD, International Technical Offices;
- Support of the EU Actions on the diffusion of electronic commerce;
- Promotional actions;
- Web site of the Advisory Board on Electronic Commerce;
- Best Practices – Initiatives for contests;
- Schemes of intervention for the electronic commerce and associated taxation and financial measures.

### ***Portuguese Initiative on Electronic Commerce (Portugal)***

This document was issued in 1998 by the Portuguese Ministry of Science and Technology and contains the principles of action of the Portuguese government, which are listed below:

- Development private initiatives of electronic commerce;
- Creation of a favourable environment for the electronic commerce, eliminating the main barriers to its development;
- Elimination of fiscal discriminations in electronic transactions;
- Rejection of any type of censorship on the Internet;
- Support the transparency of the system of management of the Internet domain names;
- Stimulation of international co-operation in the context of electronic commerce.

### ***International Benchmarking Report 2000 (United Kingdom)***

The research underlying this document was sponsored by the Department of Trade and Industry and aims at benchmarking the UK's progress in electronic commerce adoption in comparison with other competitive countries (France, Germany, Italy, Sweden, US, Canada and Japan) by means of 6000 telephone interviews. The principal objectives of the study are to enhance the understanding of the levels of ownership and usage of ICT by UK businesses, to measure the UK's performance against other benchmarked countries and to highlight areas of relative strength and weaknesses across all sizes of businesses, to assess progress against the government's targets of ensuring that 1.5 million micro businesses and SMEs are on line by 2002, 1 million micro businesses and SMEs are trading on-line by 2002 and the performance of UK's micro and small businesses is in line with the best in the world. The report compares the government's electronic commerce targets with the UK's actual electronic commerce status.

The results show that 1.7 million SMEs are now connected to the digital marketplace and that 450.000 SMEs are trading on-line. Furthermore, the research reveals that while applications such as electronic messaging and on-line marketing are relatively widespread, on-line activities that require an increasing level of interaction and technical complexity have lower levels of adoption. However, the UK performs consistently well compared to other benchmarked countries in adoption of these more complex applications. The following indicators are included in the report:

- 1) connectivity indicator - this indicator measures the number of businesses within the benchmarked countries that either have a web site, make frequent use of external e-mail or use electronic data interchange;
- 2) e-commerce adoption indicators: number of businesses using e-mail daily, number of businesses having a marketing web site, number of businesses that allow the customers to order on-line, number of businesses that allow the customers to pay on-line, number of businesses trading on-line.

### ***E-commerce @ its.best.uk: A Performance and Innovation Unit Report (United Kingdom)***

This document was produced by the UK Cabinet Office in 1999 with the main aim of launching the E-Commerce Project, and thus contains ample recommendations for the UK government to help implement electronic commerce. The introduction sets the electronic commerce scene both internationally and nationally, listing the various actions carried out by the key supranational bodies to the benefit of electronic commerce. The issues tackled include: taxation, access, e-government, behaviour and trust in e-commerce and its monitoring. The document states that e-commerce will bring about a significant impact from individual companies to the whole of the economy including productivity, employment and economic growth, that investment in ICT, accompanied by appropriate changes in business processes can bring high rates of return, and that if UK businesses do not successfully embrace the opportunities presented, both jobs and prosperity will be eroded by on-line competition from other markets.

The government's vision for the UK is that it will be a world class centre for e-commerce and the leading hub for e-commerce activity within a successful single European market, building strategic links with other EU member states. The key priorities are to overcome business inertia, to ensure that government's own actions drive the take-up of e-commerce, to ensure better co-ordination between the government and the industry to gain the maximum benefit from existing and proposed programmes. The following indicators are considered in the document as ideal measurement for outcome and net impact:

- Output measures
  - Infrastructure businesses: sales and output, value-added, employment/self employment, capital expenditure, R&D expenditures, labour productivity
  - Businesses which trade electronically: total volume of business conducted electronically, profitability of e-business comparable to other sectors, business investment in hardware/software
  - Consumer purchases: total volume of purchases made electronically, split between domestic sales and imports
  - Public sector: proportion of routine government transactions handled electronically, proportion of businesses paying tax over the Internet, proportion of all taxes paid electronically.
- Net impact measures
  - % of businesses which have found e-commerce has reduced costs/raised productivity, reduced/increased employment levels, improved product quality, improved customer service
  - % of consumers who have found e-commerce has lowered the prices they pay, improved product quality, improved customer service, reduced the time spent shopping with resulting savings
  - % growth in productivity of businesses adopting e-commerce.

### ***Promoting Electronic Commerce (United Kingdom)***

This paper was issued by the Department of Trade and Industry in 1999 and contains an invitation for comments on the government's proposals for an Electronic Communications Bill and some explanatory notes on the Bill as well as the Bill's draft. In the second part, the paper also introduces background activities explaining the government's aims with passing this bill. Since the Bill's main purpose is to facilitate the electronic commerce, it deals with issues that could hinder its evolution. This includes security regulations such as cryptography and protected electronic data. The section dedicated to the facilitation of electronic commerce deals specifically with electronic signatures' legal status. The government's objectives for the Bill are to facilitate the electronic commerce, to ensure that 25% of government facilities will be available on line by 2002, 50% by 2005 and 100% by 2008, to guarantee that 90% of routine government procurement of goods will be done electronically by 2001.

### ***Measuring e-commerce: Recommendations for a Dutch e-commerce monitor (Netherlands)***

The paper was produced by Dialogic Innovatie & Interactie in collaboration with the Delft University of Technology and the Electronic Commerce Platform Nederland and gives an outline of the company's views on electronic commerce, which can be summarised as follows:

- E-commerce marks the move towards a digital economy
- E-commerce is not a technology, it has more to do with the development of electronic services
- E-commerce leads to a process of value chain deconstruction and reconstruction
- E-commerce calls for new business models, which will differ in terms of the number of functions or business processes that can be carried out by electronic means, as well as a degree of innovation
- The potential impact of e-commerce is different (changing requirements in terms of worker knowledge and skills, and changing international competition).

The model is based upon five dimensions: phase in the adoption process (dimension of time, readiness, intensity and impact), technology, actors, products, processes in the value chain (gathering information, placing an order/purchasing, delivery, payment, customer support). The document concludes with the presentation of an overview of ideal electronic commerce indicators, which are divided as follows:

- CONSUMER Readiness
  - Socio-demographic variables
  - PC household
  - Modem household
  - .....
- CONSUMER Intensity
  - Purchasing behaviour: start
  - Purchasing behaviour: extent
  - Purchasing behaviour: category
  - .....
- CONSUMER Impact
  - Satisfaction
  - Repeat purchases
  - Substitution
  - .....
- BUSINESS Readiness
  - Size
  - Sector
  - .....
- BUSINESS (SUPPLY SIDE) Intensity
  - Transaction steps
  - Purchasing behaviour: collecting information
  - Sales: start
  - .....
- BUSINESS (DEMAND SIDE) Intensity
  - Transaction steps
  - Facilities/applications
  - Purchasing behaviour: start
  - .....
- BUSINESS Impact
  - Employment
  - Substitution
  - Added value
  - .....

***Status Quo and Development Prospects of Electronic Commerce in Germany, Europe and USA, with Special Consideration of its Use in Small and Medium Sized Businesses; Abridged Version for the Federal Ministry of Economy and Technology (Germany)***

The report was prepared for the Federal Ministry of Economy and Technology and mainly deals with the identification of Germany's situation with respect to the adoption of electronic commerce with a final goal at promoting the Information Society. It aims at identifying the requirements needed to boost electronic commerce in Germany, by means of a comparison with that of other European countries and the USA. The report is especially focused on SMEs and suggests electronic commerce strategies for them, such as the opening of new access opportunities to the Internet and education of non-users, the end goal being to avoid any digital exclusion both on the part of companies and the population at large. This is because, despite "schools on the net" programme, which have had immense positive repercussions on the German Information Society, there is still a shortage of qualified teaching staff.

The document opens the scene of the effects of electronic commerce, by stating that it provides many SMEs with considerable competitive advantages by reducing costs, it opens up new prospects for the development of innovative business models, it has shaken up SMEs due to the falling of entry barriers in the markets and an increase in competition. The report numbers main e-commerce strategies for SMEs, such as SMEs should closely monitor e-commerce developments to allow them ample reactionary time for any changes in market conditions; SMEs must learn from predecessors' mistakes; clear strategic orientation, complete integration of front-end applications with each other and subsequent business processes; co-operation with partners from neighbouring sectors. Data for the use of ICT by establishments for Germany, Finland, France, UK, Italy, Netherlands and the US are presented in a table, as is the use of e-commerce in establishments (by establishments' size). The report concludes with an overview of the conditions for electronic commerce in Germany, stating that the high costs and lack of specialised know-how of developing the electronic commerce, and the high costs for telecommunication services are two of the most impeding barriers to the widespread evolution of electronic commerce. The report clearly states that concerns regarding security of data transfer as well as the danger of fraud are not decisive in the fundamental decision of large sections of the population and economy not to use the electronic commerce.

The following indicators can be found in the report:

- Use of ICT by establishment: use of e-mail, access to the Internet, use of the Internet, use of video conferencing, use of call centres, employee access to the Internet;
- Use of e-commerce: on-line presence, advertising and marketing on-line, on-line distribution, on-line data exchange with suppliers and partners, joint business processes on-line;
- Use of ICT by the general population;

## 6.7. Review of existing indicators

This section presents a list of existing indicators according to the theoretical framework presented in section 2, i.e. distinguishing between indicators of electronic commerce readiness, intensity and impact. This will be useful in order to identify the areas in which better and more indicators are needed. The chapter will first present an overview table and then provide a detailed table for each indicator.

### Overview table

No.	Indicator	Sub-Domain	Main Source
A1	Internet users	E-commerce readiness	OECD
A2	Internet hosts	E-commerce readiness	OECD
A3	Mobile Internet users	E-commerce readiness	IDC
A4	Charging practices for residential users	E-commerce readiness	OECD
A5	Secure servers for e-commerce	E-commerce readiness	OECD
A6	Web servers	E-commerce readiness	OECD
A7	International Internet bandwidth	E-commerce readiness	OECD
A8	Internet multimedia content	E-commerce readiness	OECD
A9	Barriers to on-line growth	E-commerce readiness	BCG
A10	E-commerce readiness: computer illiterates, offline computer users, non-buying Internet users, Internet buyers	E-commerce readiness	IDC
A11	Number of devices accessing the Web	E-commerce readiness	IDC
A12	Presence of services to support e-commerce activities	E-commerce readiness	Assintel
A13	Types of services to support e-commerce activity	E-commerce readiness	Assintel
A14	Ways of payment	E-commerce readiness	BCG
A15	Marketing expenses	E-commerce readiness	BCG
A16	Presence of e-commerce application on the site	E-commerce readiness	Assintel
A17	Type of payment	E-commerce readiness	Assintel
A18	Percentage of companies with a web site	E-commerce readiness/intensity	Booze Allen and Hamilton; Nordic Countries Statistics
A19	Share of enterprises with the possibility of receiving orders via their home pages	E-commerce readiness/intensity	Nordic Countries Statistics
A20	Costs of implementing e-commerce solutions	E-commerce readiness/impact	Assintel
B1	Transaction value of e-commerce	E-commerce intensity	OVUM
B2	Mobile e-commerce users	E-commerce intensity	EITO
B3	Mobile e-commerce revenues	E-commerce intensity	EITO
B4	B2C e-commerce penetration rate as % of retail sales	E-commerce intensity	OECD
B5	On-line buyers	E-commerce intensity	OECD
B6	Demographics of on-line buyers	E-commerce intensity	Emarketer
B7	E-commerce penetration by product	E-commerce intensity	OECD
B8	Use of stored value cards	E-commerce intensity	OECD
B9	Average monthly and yearly expenditures on e-commerce	E-commerce intensity	IDC
B10	Average quarterly on-line expenditure	E-commerce intensity	Emarketer
B11	Average annual B2C on-line spending per buyer	E-commerce intensity	Emarketer
B12	E-commerce revenues	E-commerce intensity	Emarketer
B13	European businesses on-line	E-commerce intensity	Emarketer
B14	E-commerce share of total domestic expenditures	E-commerce intensity	Emarketer
B15	On-line B2C sales	E-commerce intensity	Emarketer
B16	Share of on-line retail revenues by country	E-commerce intensity	Emarketer
B17	European ICT e-business market value	E-commerce intensity	EITO
B18	Growth in the number of e-marketplaces	E-commerce intensity	EITO
B19	Penetration of one-to-many e-commerce applications	E-commerce intensity	EITO
B20	Growth of on-line retailing	E-commerce intensity	BCG
B21	Multi-channel vs. Pure Play Retailers (% of market shares)	E-commerce intensity	BCG
B22	Products and services purchased on-line	E-commerce intensity	IDC

No.	Indicator	Sub-Domain	Main Source
B23	Light and heavy web buyers	E-commerce intensity	IDC
B24	Sites' income by category	E-commerce intensity	BCG
B25	Presence and type of e-commerce activity	E-commerce intensity	Assintel
B26	Type of goods sold	E-commerce intensity	Assintel
B27	Percentage of commercial transactions conducted over the Internet	E-commerce intensity	Infratest Burke
B28	Number of e-marketplaces	E-commerce intensity	Infratest Burke
B29	Present and planned e-business activities	E-commerce intensity	Infratest Burke
B30	Use of e-commerce	E-commerce intensity	Empirica
B31	E-commerce type	E-commerce intensity	Empirica
B32	E-commerce use by consumers	E-commerce intensity	Empirica
B33	Internet usage of the enterprises as customers	E-commerce intensity	Nordic Countries Statistics
C1	Impact of e-commerce on company process and organisation	E-commerce impact	Assintel
C2	Expected e-commerce share of total company purchases	E-commerce impact	Infratest Burke
C3	German B2B turnover of the 7 most important e-commerce industries	E-commerce impact	Infratest Burke
C4	B2C e-commerce turnover	E-commerce impact	Infratest Burke

## E-Commerce Readiness

A1	Internet users
Definition	The indicator measures the number of Internet users (absolute values and per thousand inhabitants)
Notes	
Sources	OECD – Communications Outlook 2001
Countries covered	OECD countries
Time series available	Data are available for 2000, but it is possible to build the time series up to 1997
E-europe relevance	
Future value	This indicator represents one of the most important signal of the e-commerce readiness. It is still the most significant measure of the Internet diffusion.
Links to other indicators	

A2	Internet Hosts
Definition	The indicator measures the number of Internet hosts (absolute values and per thousand inhabitants)
Notes	
Sources	OECD – Communications Outlook 2001
Countries covered	OECD countries
Time series available	Data are available for 2000, but it is possible to build the time series up to 1997
Europe relevance	
Future value	This indicator represents one of the most important signal of the e-commerce readiness. It is still the most significant measure of the Internet infrastructure and therefore it will be quite useful also in the future.
Links to other indicators	An interesting issue concerning this indicator – as other indicators related to the e-commerce readiness – is to evaluate how the development of infrastructure is related to the diffusion of e-commerce.

<b>A3</b>	<b>Mobile Internet users</b>
Definition	The indicator measures the diffusion of mobile Internet (% of the population)
Notes	
Sources	IDC – Mobile Data in Western Europe – Applications on the move – Forecast and analysis, 1999-2004
Countries covered	Totals for Western Europe and detailed country forecasts (15 EU countries, Norway and Switzerland)
Time series available	Data for 1999, forecast period: 2000-2004
Europe relevance	
Future value	This indicator illustrates the diffusion of Internet over mobile phones, which is a signal of the advancement of the Internet usage and represents as well an indicator of e-commerce readiness. It will continue to be of interesting value also in the future.
Links to other indicators	The diffusion of mobile Internet could be related to the diffusion of fixed Internet.
<b>A4</b>	<b>Charging practices for residential users</b>
Definition	This indicator illustrates the charging practices for the local access to the Internet by residential users
Notes	The available information relates to Internet access by DSL, Internet access by cable and to various Internet access
Sources	OECD - Local Access Pricing and E-commerce
Countries covered	OECD countries
Time series available	Data for 2000
Europe relevance	
Future value	This indicator measures the readiness of e-commerce and is still relevant in consideration of the fact that the usage of the Internet in some countries is still limited by the high costs.
Links to other indicators	This indicator can be utilised to test the effect of e-commerce readiness over the e-commerce intensity.
<b>A5</b>	<b>Secure servers for e-commerce</b>
Definition	This indicator measures the number of secure servers per 1 million inhabitants
Notes	
Sources	OECD - Local Access Pricing and E-commerce
Countries covered	OECD area
Time series available	Data for 2000
Europe relevance	
Future value	This indicator will continue to be relevant in the future, in that it constitutes an important measure of the e-commerce readiness
Links to other indicators	This indicator could be used to build a synthetic indicator of the e-commerce readiness, together with other variables of infrastructure
<b>A6</b>	<b>Web servers</b>
Definition	This indicator measures the number of web servers per million inhabitants
Notes	
Sources	OECD - Local Access Pricing and E-commerce
Countries covered	OECD area
Time series available	Data for 2000
Europe relevance	
Future value	This indicator contributes at measuring the e-commerce readiness, but in the future it will become less important, as the number of servers is already quite homogeneous in the OECD area
Links to other indicators	This indicator could be used to build a synthetic indicator of the e-commerce readiness, together with other variables of infrastructure
<b>A7</b>	<b>International Internet bandwidth</b>
Definition	This indicator shows the availability of bandwidth by country
Notes	
Sources	OECD - Local Access Pricing and E-commerce
Countries covered	OECD area
Time series available	Data for 2000
Europe relevance	
Future value	This indicator contributes at measuring the e-commerce readiness, since it provides information on the Internet access speed. Differences between countries in this area may lead to important differences in the rate of diffusion of e-commerce.
Links to other indicators	This indicator could be used to build a synthetic indicator of the e-commerce readiness, together with other variables of infrastructure

<b>A8</b>	<b>Internet multimedia content</b>
Definition	
Notes	
Sources	OECD - Local Access Pricing and E-commerce
Countries covered	OECD area
Time series available	Data for 2000
Europe relevance	
Future value	
Links to other indicators	

<b>A9</b>	<b>Barriers to on-line growth</b>
Definition	This indicator illustrates the existing barriers to on-line growth such as costs (per month) and consumer confidence (% of consumers providing personal data)
Notes	The data were collected through a survey involving 546 major European on-line retailers
Sources	The Boston Consulting Group - The Race for On-line Riches - E-tailing in Europe
Countries covered	Western Europe
Time series available	Data for 1999
Europe relevance	
Future value	This indicator is quite important in order to understand what are the main obstacles to the development of (B2C) e-commerce
Links to other indicators	

<b>A10</b>	<b>E-commerce readiness</b>
Definition	This indicator measures the e-commerce readiness by pulling together the following variables: computer illiterates, offline computer users, non-buying Internet users, Internet buyers
Notes	Average of surveyed countries
Sources	IDC's Annual eConsumer Survey: European Internet Economy - Ready for 2001?
Countries covered	14 largest Internet markets in Western Europe
Time series available	Data for 1999 and 2000
Europe relevance	
Future value	This indicator represents an important example of how to combine different variables in order to measure the e-commerce readiness and will constitute a relevant point of reference for future research
Links to other indicators	

<b>A11</b>	<b>Number of devices accessing the web</b>
Definition	This indicator measures the number of devices accessing the web
Notes	Market size estimates and forecasts
Sources	IDC - The Global Market Forecast for Internet Usage and Commerce
Countries covered	Regional forecasts in Latin America, Western Europe and Asia/Pacific have been developed on a country-level basis and then rolled up to represent the region.
Time series available	1995-2003
Europe relevance	
Future value	This indicator provides valuable information on the e-commerce readiness and is going to be even more useful in the future, following the diffusion of alternative access devices to the Internet (e.g. set-top-box)
Links to other indicators	It would be interesting to have a breakdown of this indicator for different web access devices

<b>A12</b>	<b>Presence of services to support e-commerce activity (Italy)</b>
Definition	This indicator illustrates the existence of business services to support e-commerce activity. Answers are: present, planned, absent, does not know / does not answer. Data are broken down by sector - finance, manufacturing, distribution, services, public administration - and by number of employees - 10-49; 50-99; 100-199; 200-499; 500 or more.
Notes	This study presents the results of a survey about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - L'analisi dei dati e degli accessi al web
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator will be useful also in the future, in order to evaluate the e-commerce readiness in the business environment
Links to other indicators	

<b>A13</b>	<b>Types of services to support e-commerce activity (Italy)</b>
Definition	This indicator illustrates the characteristics of business services to support e-commerce activity. Answers are: FAQ, search databases, general information, e-mail FAQ auto-responder, answers to e-mails, answers to forms filled in by users, other, does not know /does not answer. Data are broken down by sector - finance, manufacturing, distribution, services, public administration - and by number of employees - 10-49; 50-99; 100-199; 200-499; 500 or more.
Notes	This study presents the results of a survey about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - L'analisi dei dati e degli accessi al web
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator is useful in order to evaluate the e-commerce readiness in the business environment with particular reference to the incentives offered to the final users. Due to the still scarce diffusion of e-commerce in Italy, this indicator will be of even more interest in the future.
Links to other indicators	This indicator is related to the previous one (A34) and can be used to evaluate the readiness of e-commerce not from an infrastructure perspective, but more from a business perspective.
<b>A14</b>	<b>Ways of payment (Italy)</b>
Definition	This indicator illustrates the alternative ways of payment made available by the on-line retailers
Notes	Information was collected by means of interviews and direct contacts with 90 Italian on-line retailers, representing 93% of the market. Data have been also integrated with public information.
Sources	Boston Consulting Group - Industria: La nuova frontiera del commercio elettronico in Italia - From the Pioneers to the Industrial Age: The New Frontier of Electronic Commerce in Italy
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator will be useful also in the future, especially with the diffusion of the electronic money
Links to other indicators	This indicator can be linked to the diffusion of e-commerce (different measures), since it assesses one of the possible barriers to the performance of on-line commercial transactions
<b>A15</b>	<b>Marketing expenses (Italy)</b>
Definition	This indicator measures the marketing expenses - dollar per client, % different Italy vs. US, Scandinavia, Germany, EU average
Notes	Information was collected by means of interviews and direct contacts with 90 Italian on-line retailers, representing 93% of the market. Data have been also integrated with public information.
Sources	Boston Consulting Group - Industria: La nuova frontiera del commercio elettronico in Italia - From the Pioneers to the Industrial Age: The New Frontier of Electronic Commerce in Italy
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator is an important measure of the investment of on-line retailers directed at capturing consumers and will be valuable also in the future.
Links to other indicators	This indicator can be linked to other supply-side indicators of the e-commerce intensity
<b>A16</b>	<b>Presence of e-commerce applications on the web site (Italy)</b>
Definition	This indicator assesses the existence of the following e-commerce applications on the web sites: showcase/information about the company, catalogue, search engine, on-line orders, on-line payments. Answers are: present, planned, absent, does not know /does not answer. Data are broken down by sector (finance, manufacturing, distribution, services, public administration) and by number of employees (10-49; 50-99; 100-199; 200-499; 500 or more)
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator is an important measure of the investment of on-line retailers directed at capturing consumers and will be valuable also in the future.
Links to other indicators	This indicator can be linked to other supply-side indicators related to the readiness of businesses to implement e-commerce solutions

<b>A17</b>	<b>Type of payment (Italy)</b>
Definition	This indicator illustrates the type of payment made available by firms - credit card, bank transfer, EDI over IP, electronic money, ATM card, other). Data are broken down by sector (finance, manufacturing, distribution, services, public administration) and by number of employees (10-49; 50-99; 100-199; 200-499; 500 or more).
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator gives an important information related to incentives to on-line commercial transactions (availability of various types of payment) and will be valuable also in the future.
Links to other indicators	This indicator can be linked to other supply-side indicators related to the availability of firms to stimulate the e-commerce.

<b>A18</b>	<b>Percentage of companies with a Web site (The Netherlands)</b>
Definition	This indicator measures the share of companies with a web site over total companies. Data are provided by sector - manufacturing, transport, communication and utilities, finance. The indicator separates also web sites with and without transactional capabilities and measures the company sites with transactional capabilities as % of company sites.
Notes	Elaboration and analysis of data come from several sources, such as IDC, Durlacher and Forrester.
Sources	Booze, Allen & Hamilton on behalf of the Dutch Ministry of Economic Affairs - The competitiveness of Europe's ICT markets
Countries covered	Japan, Germany, Sweden, France, UK, Italy, The Netherlands, USA
Time series available	Data for 1999
Europe relevance	
Future value	This indicator provides interesting insights on the e-commerce activity carried out by firms and represents both a measure of e-commerce intensity and partly a measure of e-commerce readiness. It will be useful also in the future.
Links to other indicators	This indicator can be linked to the indicators related to the size of e-commerce and to the use of e-commerce by firms and consumers.

<b>A19</b>	<b>Share of enterprises with the possibility of receiving orders via their home pages (Nordic Countries)</b>
Definition	This indicator measures the number of enterprises that can receive orders directly on the web as a share of enterprises (samples). Data are provided by industry and size.
Notes	The report is based upon samples of 3000 firms each in Finland and Sweden and 4000 firms each in Denmark and Norway.
Sources	Denmark Statistics, Statistics Finland, Statistics Norway, Statistics Sweden - Use of ICT in Nordic enterprises, 1999-2000
Countries covered	Norway, Denmark, Sweden, Finland
Time series available	Data for 1999
Europe relevance	
Future value	This indicator shows the rate of development of on-line activity by firms and will be useful in the future.
Links to other indicators	This indicator can be associated with the other indicators of e-commerce intensity

<b>A20</b>	<b>Costs of implementing e-commerce solutions (Italy)</b>
Definition	This indicator measures the costs of implementing e-commerce solutions (less than 20 million Italian lire, 20-50 million Italian lire, etc.) by sector and by size.
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator represents a measure of the e-commerce readiness and impact, and will be more and more useful as the e-commerce will diffuse extensively.
Links to other indicators	There is the need to develop such indicators for all countries and to evaluate systematically the impact of e-commerce not only on firms' activity, but on the economy as a whole.

## E-Commerce Intensity

<b>B1</b>	<b>Transaction value of e-commerce</b>
Definition	The indicator measures the value of Internet commerce in million US\$ from 2000 to 2005
Notes	Data are provided for fixed (total, web based B2B, other B2B and B2C) and mobile e-commerce (total, consumer use, business use)
Sources	OVUM – Ovum Forecasts the Internet and E-commerce 2000
Countries covered	US, Canada, Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, Czech Republic, Hungary, Poland, Russia, China, Hong Kong, India, Australia, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan, Thailand, Vietnam, Iran, Israel, Saudi Arabia, South Africa, Turkey, United Arab Emirates
Time series available	Forecasts 2000-2005
Europe relevance	
Future value	This indicator represents a crucial information concerning the magnitude of e-commerce and will be relevant also in the future
Links to other indicators	
<b>B2</b>	<b>Mobile e-commerce users</b>
Definition	The indicator measures the number of users of mobile e-commerce services (million units) and the percentage of the population that uses mobile e-commerce services
Notes	Data are provided for total, consumer use, business use
Sources	EITO – European Information Technology Observatory 2001
Countries covered	Western Europe, Finland France, Germany, Italy, Spain, UK
Time series available	Forecasts 2000-2005
Europe relevance	
Future value	This indicator represents an important information concerning the technological evolution of e-commerce and will be more and more relevant in the future, especially considering the widespread diffusion of mobile phones in most European countries
Links to other indicators	An interesting issue is the comparison of this indicator with the number of users of fixed e-commerce (via PC) in order to understand the pattern of usage of e-commerce in Europe.
<b>B3</b>	<b>Mobile e-commerce revenues</b>
Definition	The indicator measures the revenues deriving from the mobile e-commerce services (million Euro)
Notes	Data are provided for total, B2B and B2C e-commerce
Sources	EITO – European Information Technology Observatory 2001
Countries covered	Western Europe, Finland France, Germany, Italy, Spain, UK
Time series available	Forecasts 2000-2005
Europe relevance	
Future value	Like indicator A2, this indicator is quite relevant in order to assess the size/intensity of the electronic commerce transactions conducted via mobile phones.
Links to other indicators	This indicator should be naturally linked with the revenues deriving from the fixed electronic commerce, in order to evaluate the intensity of usage of mobile Internet commercial transactions.
<b>B4</b>	<b>B2C e-commerce penetration rate as % of retail sales</b>
Definition	The indicator measures the incidence of e-commerce over total B2C commercial transactions
Notes	
Sources	OECD – E-commerce: impact and policy challenges
Countries covered	All EU countries (excluding Luxembourg and Switzerland), USA, Canada, Australia and Japan
Time series available	1999; growth rate 1998-1999
Europe relevance	
Future value	This indicator represents an important measure of the e-commerce impact. It indicates how extensively the e-commerce is affecting the economic activity within a country and measures the relative impact of on-line commercial transactions on the internal and external trade.
Links to other indicators	This indicator constitutes one of the most important measures of the incidence of the electronic commerce and could be linked to the indicators related to the e-commerce readiness (infrastructure) and intensity, in order to see if there is any correlation between the three dimensions.

<b>B5</b>	<b>On-line buyers</b>
Definition	The indicator measures the number of on-line buyers – absolute value (thousands units), % of working age population, % of Internet users percentage of Internet users that buy on-line
Notes	
Sources	OECD – E-commerce: impact and policy challenges / IDC – Annual eConsumer Survey: European Internet Economy – Ready for 2001
Countries covered	All EU countries (excluding Luxembourg and Switzerland), USA, Canada, Australia and Japan
Time series available	1998-2000
Europe relevance	
Future value	This indicator represents the primary measure of the e-commerce penetration and will be of future value at least until the diffusion of e-commerce reaches very high levels – so that the number of buyers will not be a relevant information
Links to other indicators	This indicator could be linked to the indicators related to the e-commerce readiness, in order to see if and how the diffusion of e-commerce is related to the availability of technological infrastructure.

<b>B6</b>	<b>Demographics of on-line buyers</b>
Definition	The indicator provides information on a number of variables related to the population of on-line buyers: age, household income, gender, marital status, education
Notes	
Sources	eMarketer - The eEurope Report 2000
Countries covered	UK, Italy, France
Time series available	2000
Europe relevance	
Future value	This indicator is quite interesting in that it offers an overview of the characteristics of the population of on-line buyers. It will be even more important in the future, in order to evaluate the main features of the pattern of e-commerce diffusion within a country.
Links to other indicators	This indicator could be related to the demographics of Internet users in order to understand if there is any correspondence between those who surf the web and those who buy on-line in terms of the available demographic statistics.

<b>B7</b>	<b>E-commerce penetration by product</b>
Definition	The indicator provides information on the types of products and services purchased on-line
Notes	The following product categories are included: financial brokerage, computer hardware and software, books, tickets, consumer electronics, music, video, travel, toys, apparel, home/garden, food/wine.
Sources	OECD – E-commerce: impact and policy challenges
Countries covered	USA and Europe
Time series available	1999
Europe relevance	
Future value	This indicator illustrates the most common products purchased on-line and it is an interesting qualitative variable both for statistical purposes and for general information.
Links to other indicators	With respect to this variable, it would be interesting to build a classification of the various products purchased on-line, whereby the prevalence of some products over other items indicates the degree of sophistication of on-line buyers and the consequent intensity of e-commerce.

<b>B8</b>	<b>Use of stored value cards</b>
Definition	The indicator provides information on the use stored value cards (thousand units)
Notes	The information concerns also the average value per reloading and the average value per purchase
Sources	OECD – E-commerce: impact and policy challenges
Countries covered	Selected EU countries: Austria, Belgium, Denmark, Finland, Germany, Italy, Portugal, Spain, UK, total.
Time series available	1995, 1996, 1997
Europe relevance	
Future value	This indicator will be of future value, as soon as the e-commerce will expand extensively across Europe
Links to other indicators	

<b>B9</b>	<b>Average monthly and yearly expenditures on mobile e-commerce</b>
Definition	The indicator measures the intensity of mobile e-commerce
Notes	Mobile commerce is defined as human-initiated purchased of products and services that occur across a mobile data platform and are transacted through non-voice mechanisms.
Sources	IDC – Mobile Data in Western Europe – Applications on the move – Forecast and analysis, 1999-2004
Countries covered	Totals for Western Europe and detailed country forecasts (15 EU countries, Norway and Switzerland)
Time series available	Data for 1999, forecast period: 2000-2004
Europe relevance	
Future value	This indicator illustrates the intensity of e-commerce over mobile phones and represents an important measure of the actual propensity of users to perform Internet-based commercial transactions over mobile phones. It will continue to be of interesting value also in the future.
Links to other indicators	This indicator can be related to the propensity of performing electronic commercial transactions over PC-based Internet.

<b>B10</b>	<b>Average quarterly on-line expenditure</b>
Definition	This indicator measures the quarterly average expenditure on electronic commercial transactions (US\$).
Notes	Data are provided for B2C, B2B and average spending per buyer
Sources	eMarketer - The eEurope Report 2000
Countries covered	UK, France, Italy, Spain, Germany
Time series available	Data for 1999-2002
Europe relevance	
Future value	This indicator illustrates the intensity of e-commerce and constitutes an important measure of the propensity of the consumers and businesses to perform Internet-based commercial transactions. It will continue to be of interesting value also in the future.
Links to other indicators	This indicator can be linked to other indicators that measure the readiness of e-commerce by country.

<b>B11</b>	<b>Average annual B2C on-line spending per buyer</b>
Definition	This indicator measures the B2C annual average expenditure on electronic commercial transactions per buyer (US\$).
Notes	
Sources	eMarketer - The eEurope Report 2000
Countries covered	Individual EU countries (excluding Luxembourg) plus Norway and Switzerland
Time series available	Data for 2002
Europe relevance	
Future value	This indicator measures the intensity of e-commerce and illustrates an important sign of the propensity of consumers to perform Internet-based commercial transactions. It will be extremely valuable also in the future.
Links to other indicators	This indicator can be linked to other indicators that measure the readiness of e-commerce by country.

<b>B12</b>	<b>E-commerce revenues</b>
Definition	This indicator provides information on the magnitude of e-commerce expenditures in billion US\$ and as % of Western European revenues (for individual countries). B2B (process and end use) and B2C revenues are measured in billion US\$.
Notes	Data are provided from IDC and from Warburg Dillon Read
Sources	eMarketer - The eEurope Report 2000
Countries covered	Total e-commerce revenues are provided for individual EU countries (excluding Luxembourg) plus Norway and Switzerland; B2B and B2C revenues are provided for Western Europe and worldwide.
Time series available	Data on total e-commerce revenues refer to the year 2000; data on B2B and B2C revenues refer to 1999-2003
Europe relevance	
Future value	This indicator measures the intensity of e-commerce. It will be extremely valuable also in the future.
Links to other indicators	This indicator can be linked to other indicators that measure the readiness of e-commerce by country.

<b>B13</b>	<b>European businesses on-line</b>
Definition	This indicator measures the number of European businesses on-line, in millions and as % of total.
Notes	
Sources	eMarketer - The eEurope Report 2000
Countries covered	Europe
Time series available	Data for 1997-1999
Europe relevance	
Future value	This indicator assesses the propensity of European businesses to go on-line and is a very important measure of the e-commerce readiness
Links to other indicators	This indicator can be linked to other indicators that measure the readiness of e-commerce (e.g. at the level of consumers).

<b>B14</b>	<b>E-commerce share of total domestic expenditures</b>
Definition	This indicator measures the percentage of total domestic expenditures that refer to electronic commercial transactions
Notes	Data are provided for total, B2C and B2B end use (i.e. goods or services that reach business end-use for final consumption)
Sources	eMarketer - The eEurope Report 2000
Countries covered	?
Time series available	Data for 1999-2002
Europe relevance	
Future value	This indicator assesses the intensity of electronic commerce as compared to the traditional off-line commerce and will be more and more valuable as the electronic commerce will diffuse extensively.
Links to other indicators	This indicator could be built for individual sectors, in order to have a more detailed picture of the pattern of diffusion and intensity of the electronic commerce

<b>B15</b>	<b>On-line B2C sales</b>
Definition	This indicator measures the amount of B2C sales in million Euro and in Euro per capita
Notes	Data are from Empirica
Sources	eMarketer - The eEurope Report 2000
Countries covered	Denmark, Finland, France, Germany, Ireland, Italy, Spain, Sweden, UK, total
Time series available	Data for 1999
Europe relevance	
Future value	This indicator assesses the intensity of B2C electronic commerce and is going to be valuable also in the future
Links to other indicators	This indicator could be built for individual sectors, in order to have a more detailed picture of the pattern of diffusion and intensity of the electronic commerce. It would be interesting to compare B2C with B2B e-commerce.

<b>B16</b>	<b>Share of on-line retail revenues</b>
Definition	This indicator measures the percentage of on-line retail revenues over total retail revenues
Notes	
Sources	eMarketer - The eEurope Report 2000
Countries covered	Germany, UK, France, Sweden, Italy, Netherlands, Switzerland, Austria, Belgium, Spain, Portugal, Norway, Finland, Denmark
Time series available	Data for 1999
Europe relevance	
Future value	This indicator assesses the intensity of retail electronic commerce as compared to the traditional off-line retail commerce and will be more and more valuable as the electronic commerce will diffuse extensively.
Links to other indicators	This indicator could be built for individual sectors, in order to have a more detailed picture of the pattern of diffusion and intensity of the electronic commerce and could also be linked with indicators related to the B2B electronic commerce by sectors.

<b>B17</b>	<b>European ICT e-business market value</b>
Definition	This indicator measures the size of the European ICT e-business market (million Euro)
Notes	Data are provided for total, one-to-many e-commerce services (implementation, application, hosting, other ongoing support services, specific e-ordering), e-marketplace ICT services (implementation, application, hosting, other ongoing support services), marketing/information web site ICT services
Sources	EITO - European Information Technology Observatory 2001
Countries covered	Europe
Time series available	Data for 2000-2002; 2000-2001 and 2001-2002 growth rates
Europe relevance	
Future value	This indicator measures the size of e-business market and is associated both to the e-commerce readiness and to the e-commerce intensity
Links to other indicators	Data are needed for individual countries and sectors. This indicator can be linked to the diffusion of on-line businesses and to the B2B revenues.

<b>B18</b>	<b>Growth in the number of e-marketplaces</b>
Definition	This indicator measures the development of e-marketplaces
Notes	
Sources	EITO - European Information Technology Observatory 2001
Countries covered	Worldwide and Europe
Time series available	Data for 2000
Europe relevance	
Future value	This indicator assesses the phenomenon of e-marketplaces and will be even more relevant in the future, as soon as the number of e-marketplaces will grow across European countries.
Links to other indicators	Breakdown of the total European e-marketplaces ICT services market value by type (sell-driven, buyer-driven, technology provider, independent, total)

<b>B19</b>	<b>Penetration of one-to-many e-commerce applications</b>
Definition	This indicator measures the penetration of one-to-many e-commerce applications as % of organisations that have a web site and have installed one-to-many e-commerce applications. These applications are: e-ordering, e-payments, e-availability checks, e-progress tracking, e-post-sales support, information e-procurement, information and order e-procurement.
Notes	Data are provided by country, industry sector (finance/insurance, non-financial services, manufacturing, public sector), by customer type (B2C and B2B) and by number of employees (< 500, = 500, > 500)
Sources	EITO - European Information Technology Observatory 2001
Countries covered	Sweden, Other Scandinavia, Germany, UK, France, Benelux, Italy, Spain, Portugal
Time series available	Data for 2000
Europe relevance	
Future value	This indicator measures the diffusion of e-commerce applications in the business environment and constitutes an important variable for future research. The breakdown by sector, customer type and number of employees is particularly useful in order to reach a high level of detail in the assessment of e-commerce.
Links to other indicators	This indicator can be linked to other measures of e-business intensity

<b>B20</b>	<b>Growth of on-line retailing</b>
Definition	This indicator measures the growth rate of on-line retailing (%)
Notes	In estimating the size and growth of on-line retail industry, the BCG survey was a primary but not the only source of revenue information. BCG also relied upon public sources, interviews, company reports and other on-line revenue proxies.
Sources	The Boston Consulting Group - The Race for On-line Riches - E-tailing in Europe
Countries covered	Western Europe
Time series available	Data for 1999
Europe relevance	
Future value	This indicator will contribute at measuring the pattern of evolution of e-commerce also in the future
Links to other indicators	The growth of on-line retailing can be associated to the barriers and incentives for consumers to purchase on-line

<b>B21</b>	<b>Multi-channel vs. pure-play retailers (% of market share)</b>
Definition	This indicator illustrates the relative market shares of multi-channel (off line and on-line) retailers vs. pure play retailers
Notes	The data were collected through a survey involving 546 major European on-line retailers
Sources	The Boston Consulting Group - The Race for On-line Riches - E-tailing in Europe
Countries covered	Western Europe
Time series available	Data for 1999
Europe relevance	
Future value	This indicator is quite important in order to understand the pattern of development of e-commerce from a supply-side perspective and to identify the main players.
Links to other indicators	

<b>B22</b>	<b>Products and services purchased on-line</b>
Definition	This indicator illustrates the most common products and services purchased on-line, by computing the share of web buyers in 13 product/service categories.
Notes	Average of surveyed countries
Sources	IDC's Annual eConsumer Survey: European Internet Economy - Ready for 2001?
Countries covered	14 largest Internet markets in Western Europe
Time series available	Data for 1999 and 2000
Europe relevance	
Future value	This indicator offers interesting insights on the characteristics of on-line purchases and on the preferences of on-line buyers, which can be of great importance for future analysis
Links to other indicators	It would be interesting to link this indicator to the corresponding supply-side indicators - number of businesses on-line by sector, penetration of one-to-many e-commerce applications etc.

<b>B23</b>	<b>Light and heavy web buyers</b>
Definition	This indicator shows the intensity of e-commerce activity by the end users. Light and heavy are computed as share of population. Heavy web buyers are those whose purchases are worth more than 100 Euro per quarter
Notes	Individual countries and average of surveyed countries
Sources	IDC's Annual eConsumer Survey: European Internet Economy - Ready for 2001?
Countries covered	14 largest Internet markets in Western Europe
Time series available	Data for 1999 and 2000
Europe relevance	
Future value	This indicator provides valuable information on the intensity of on-line purchases by consumers and is an important sign of the current (and future) pattern of development of e-commerce - whether it will remain a mere alternative to off line commerce or it will have a strong impact on the economic activity as a whole.
Links to other indicators	This indicator could be associated to the magnitude of e-commerce, in order to see if there is any correspondence between the diffusion of e-commerce and its intensity.

<b>B24</b>	<b>Sites' income (Italy)</b>
Definition	This indicator measures the web sites' income by category (billions of Italian lire, % difference 1998-1999)
Notes	Information was collected by means of interviews and direct contacts with 90 Italian on-line retailers, representing 93% of the market. Data have been also integrated with public information.
Sources	Boston Consulting Group - Industria: La nuova frontiera del commercio elettronico in Italia - From the Pioneers to the Industrial Age: The New Frontier of Electronic Commerce in Italy
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator provides interesting insights on the market potential of different retailers and will be quite useful in the future.
Links to other indicators	This indicator can be associated to the demand-side indicators concerning users' preferences and purchasing behaviour

<b>B25</b>	<b>Presence and type of e-commerce activity (Italy)</b>
Definition	This indicator evaluates the existence and type of e-commerce activity (B2C, B2B, both, does not know / does not answer). Data are provided by sector (finance, manufacturing, distribution, services, public administration) and by number of employees (10-49; 50-99; 100-199; 200-499; 500 or more)
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator is an important measure of the diffusion of e-commerce among enterprises and is going to be quite valuable also in the future
Links to other indicators	This indicator can be linked to other supply-side indicators related to the readiness of businesses to implement e-commerce solutions

<b>B26</b>	<b>Type of goods sold (Italy)</b>
Definition	This indicator illustrates the type of goods sold on-line by firms - tangibles, intangibles, both, does not know/does not answer. Data are broken down by sector (finance, manufacturing, distribution, services, public administration) and by number of employees (10-49; 50-99; 100-199; 200-499; 500 or more).
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator gives an important information related to the characteristics of the e-commerce in Italy, particularly because it distinguishes between tangible and intangible goods.
Links to other indicators	This indicator can be linked to the other indicators related to the supply-side attitude towards the e-commerce

<b>B27</b>	<b>Percentage of commercial transactions conducted over the Internet (Germany)</b>
Definition	This indicators measures the share of on-line commercial transactions over total commercial transactions.
Notes	
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	UK, Germany, France, Italy, Finland, The Netherlands, USA
Time series available	1999
Europe relevance	
Future value	This indicator represents a measure of e-commerce intensity and will be valuable also in the next years, in order to evaluate the diffusion of e-commerce.
Links to other indicators	This indicator could be linked to the measures of the magnitude of e-commerce transactions and to the indicators of e-commerce readiness.

<b>B28</b>	<b>Number of e-marketplaces (Germany)</b>
Definition	This indicators measures the number of e-marketplaces
Notes	
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	Germany and USA
Time series available	1999 - 2001
Europe relevance	
Future value	This indicator represents a valuable information in order to assess the e-commerce intensity
Links to other indicators	This indicator can be linked to the growth in the number of e-marketplaces and to the indicators of e-commerce readiness.

<b>B29</b>	<b>Present and planned e-business activities (Germany)</b>
Definition	This indicators illustrates the present and planned e-business activities in Germany - % of interviewees. The following activities are considered: information, customer care, administration, internal product information, procurement, document and workflow management, ERP, logistics, training, e-marketplaces, payments.
Notes	
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	Germany
Time series available	2000 and 2003
Eeurope relevance	
Future value	This indicator is a measure of the e-commerce intensity and will be of future value especially in the next years.
Links to other indicators	This indicator can be associated with the other indicators of e-commerce intensity that relate to the supply-side

<b>B30</b>	<b>Use of e-commerce (Germany)</b>
Definition	This indicator illustrate the use of e-commerce by enterprises with on-line presence - advertising and marketing, transactions over the Internet, data exchange with suppliers and business customers, on-line business processes. Data are provided by industry, by location and by type of business.
Notes	The company survey is based on a stratified random sample of non-agricultural businesses. The sample has been stratified by size and sector.
Sources	Empirica on behalf of the German Ministry for Economy and Technology - Stand und Entwicklungsperspektiven des Elektronischen Geschaeftsverkehrs.
Countries covered	Germany, Finland, France, UK, Italy, The Netherlands, USA
Time series available	Data for 2000
Eeurope relevance	
Future value	This indicator shows the intensity of use of e-commerce by firms and is going to be quite important in the future
Links to other indicators	This indicator can be linked to e-commerce type and e-commerce use by consumers (A52, A53), as well as to other e-commerce intensity measures.

<b>B31</b>	<b>E-commerce type (Germany)</b>
Definition	This indicator illustrates the type of e-commerce carried out by firms with on-line presence - general use, business-to-business on-line integration, on-line sales, Web marketing, basic on-line presence. Data are broken down by size, industry, location and type of business.
Notes	The company survey is based on a stratified random sample of non-agricultural businesses. The sample has been stratified by size and sector.
Sources	Empirica on behalf of the German Ministry for Economy and Technology - Stand und Entwicklungsperspektiven des Elektronischen Geschaeftsverkehrs.
Countries covered	Germany, Finland, France, UK, Italy, The Netherlands, USA
Time series available	Data for 2000
Eeurope relevance	
Future value	This indicator provides interesting insights on the e-commerce activities carried out by firms and can be interpreted as a measure of e-commerce intensity, which will be valuable also in the future.
Links to other indicators	This indicator can be associated with the other indicators of e-commerce intensity

<b>B32</b>	<b>E-commerce use by consumers (Germany)</b>
Definition	This indicator illustrates the type of e-commerce activities performed by consumers - on-line shopping, on-line banking, on-line payments, on-line job search. Data are broken down by age, by sex, by education.
Notes	The company survey is based on a stratified random sample of non-agricultural businesses. The sample has been stratified by size and sector.
Sources	Empirica on behalf of the German Ministry for Economy and Technology - Stand und Entwicklungsperspektiven des Elektronischen Geschaeftsverkehrs.
Countries covered	Germany, Finland, France, UK, Italy, The Netherlands, USA
Time series available	Data for 2000
Eeurope relevance	
Future value	This indicator provides interesting insights on the use of electronic commerce by end users and will be of future value.
Links to other indicators	

<b>B33</b>	<b>Internet usage of the enterprises as customers (Nordic countries)</b>
Definition	This indicator illustrates the expectations of Internet usage of the enterprises as customers - % of enterprises with Internet access; information search, download of digital products, ordering goods and services, electronic payment.
Notes	The report is based upon samples of 3000 firms each in Finland and Sweden and 4000 firms each in Denmark and Norway.
Sources	Denmark Statistics, Statistics Finland, Statistics Norway, Statistics Sweden - Use of ICT in Nordic enterprises, 1999-2000
Countries covered	Norway, Denmark, Sweden, Finland
Time series available	Data for 1999
Europe relevance	
Future value	This indicator illustrates the intensity of usage of the Internet by firms and will be useful in the next years as a measure of e-commerce intensity.
Links to other indicators	This indicator can be associated with the other indicators of e-commerce intensity.

### E-Commerce Impact

<b>C1</b>	<b>Impact of e-commerce on company process and organisation (Italy)</b>
Definition	This indicator aims at measuring the impact of e-commerce on company processes and organisation - production process, logistics, marketing, intermediaries, purchases, delivery, none, does not know /does not answer. Data are provided by company size and by sector
Notes	This study presents the results of a survey on the universe of Italian enterprises with more than 10 employees about web accesses conducted by SIRMI for Assintel, the Italian association of IT and robotics enterprises.
Sources	Assintel - Il commercio elettronico in Italia: situazione e prospettive
Countries covered	Italy
Time series available	Data for 2000
Europe relevance	
Future value	This indicator represent one of the few examples of measures directed at assessing the e-commerce impact on the economic activity and will be extremely valuable in the future.
Links to other indicators	There is the need to develop such indicators for all countries and to evaluate systematically the impact of e-commerce not only on firms' activity, but on the economy as a whole.

<b>C2</b>	<b>Expected e-commerce share of total company purchases (Germany)</b>
Definition	This indicator measures the expected e-commerce share of total company purchases. The basis is represented by companies with a turnover of 300 million US\$ or more and a person in charge of e-commerce.
Notes	Data from KPMG, 1999
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	Scandinavia, Italy, Benelux, UK, Spain, France, Germany, Switzerland, rest of Europe.
Time series available	Forecasts for 2002
Europe relevance	
Future value	This indicator constitutes a measure of the e-commerce impact, and will be more and more useful as the e-commerce will diffuse extensively.
Links to other indicators	

<b>C3</b>	<b>Germany B2B turnover of the 7 most important e-commerce industries (Germany)</b>
Definition	This indicators measures the B2B turnover of the 7 most important e-commerce industries - constructions, chemicals and pharmaceuticals, energy, automotive sector, financial services, distribution, electric ad electronic products/hardware) - billion DM
Notes	
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	Germany
Time series available	1999, 2000, 2002, 2004
Europe relevance	
Future value	This indicator represents a measure of the e-commerce impact over the industrial activity and will be of future value.
Links to other indicators	There is the need to develop such indicators for all countries and to evaluate systematically the impact of e-commerce not only on firms' activity, but on the economy as a whole.

<b>C4</b>	<b>B2C e-commerce turnover (Germany)</b>
Definition	This indicators measures the B2C turnover - absolute values (million Euro) and per capita expenditure
Notes	
Sources	Infratest Burke on behalf of the German Ministry for Economy and Technology - Monitoring Informationwirtschaft E- and M-Commerce
Countries covered	UK, Germany, France, Italy, Finland, Denmark, Sweden, Ireland, Spain
Time series available	1999
Europe relevance	
Future value	This indicator is also an e-commerce impact measure (related to B2C) and will constitute valuable information in the next years.
Links to other indicators	There is the need to develop such indicators for all countries and to evaluate systematically the impact of e-commerce not only on firms' activity, but on the economy as a whole.

## 7. Bibliography

Assintel (2000), *Il commercio elettronico in Italia: situazione e prospettive*.

Atrostic, B.K., Gates, J. and Jarmin, R.S. (2000), *Measuring the Electronic Economy: Current Status and Next Steps*. U.S. Census Bureau.

Booz, Allen & Hamilton (2000), *The competitiveness of Europe's ICT markets*.

Brynjolfsson, E. and Yang, S. (1996), "Information Technology and Productivity: A Review of the Literature", in *Advances in Computers*, vol.43, pp.179-214.

Colecchia, A. (2000), *Defining and measuring electronic commerce - Towards the development of an OECD methodology*. OECD, Paris.

Denmark Statistics, Statistics Finland, Statistics Norway, Statistics Sweden (2001), *Use of ICT in Nordic enterprises, 1999-2000*.

Dialogic Innovatie and Interactie (1999), *Measuring E-commerce: Recommendations for a Dutch E-commerce Monitor*.

*E-commerce in Europe* by Richard Deiss, Statistics in Focus, Industry Trade and Services, Theme 4 - MM/2002, Eurostat

EITO - European Information Technologies Observatory (2001-2002).

EITO (2001), *European Information Technology Observatory 2001*.

*Electronic Commerce and Business Change* by Tony Clayton, New Economy Branch, Office for

National Statistics, UK, and Chiara Criscuolo, Centre for Research into Business Activity, *Economic Trends* n. 583 June 2002

eMarketer (2000), *The eEurope Report 2000*.

Empirica (2000), *Stand und Entwicklungsperspektiven des Elektronischen Geschaeftsverkerhs*.

Empirica (2000), *Status Quo and Development Prospects of Electronic Commerce in Germany, Europe and the USA, with Special Consideration of its Use in Small and Medium Sized Businesses*. Abridged Version for the Federal Ministry of Economy and Technology.

EU (2000), *The Creation of the .eu Internet Top Level Domain*. Working Paper.

EU-ISPO (2001), *Basic Facts and Indicator. E-Commerce Market Overview*.

European Commission (2000), *Measuring Information Society*. A Eurobarometer survey carried out by INRA (Europe).

European Commission (2001), *Helping SMEs to Go Digital*.

European Commission (2001), *The Digital Divide - A Research Perspective*. Report to the G8 Digital Opportunities Task Force.

European Council (2000), *Introductory Note to the "Objectives in the fight against poverty and social exclusion"*. European Council on Employment and Social Policy.

Eurostat (2001), *Consumers in Europe. Facts and Figures*. European Commission, Brussels.

Fraumeni, B.M., Lawson, A.M. and Ehemann, G.C. (1999), *The National Accounts in a Changing Economy: How BEA Measures E-Commerce*. U.S. Department of Commerce - Bureau of Economic Analysis.

*Getting the Measure of the New economy* by Diane Coyle & Danny Quah, iSociety project May 2002, The Work Foundation, UK, [www.theworkfoundation.com](http://www.theworkfoundation.com)

Haltiwanger, J. and Jarmin, R.S. (1999), *Measuring the Digital Economy*. U.S. Census Bureau.

*ICT and business performance in Italy*, first draft, by Andrea de Panizza, Leopoldo Nascia,

Alessandra Nurra, Filippo Oropallo, Fabiola Riccardini, ISTAT, presented at NESIS conference in Olympia, 10-14 June 2002

IDC (2000), *IDC's Annual eConsumer Survey: European Internet Economy - Ready for 2001*.

IDC (2000), *The Global Market Forecast for Internet Usage and Commerce*.

IDC (2001) *Mobile Data in Western Europe - Applications on the move - Forecast and analysis, 1999-2004*.

IDC (2001), *Annual eConsumer Survey: European Internet Economy - Ready for 2001*.

Infratest Burke (2001), *Monitoring Informationwirtschaft E- and M-Commerce. Internet Diffusion Dynamics in Europe: demand scenarios and the digital divide*

Issue report n.29 July 2002, by Nicoletta Corrocher, Università Bocconi, Databank Consulting, STAR project, [www.databank.it/star](http://www.databank.it/star)

Italian Ministry of Industry, Commerce and Handicraft (1998), *Electronic Commerce Policy Guidelines*.

*Measuring the Digital Divide: a framework for the analysis of cross-country differences* by Nicoletta Corrocher and Andrea Ordanini, Bocconi University, *Journal of Information Technology*, 2002, [www.tandf.co.uk/journals](http://www.tandf.co.uk/journals)

Mesenbourg, T.L. (2000), *Measuring electronic business*. U.S. Census Bureau.

Meyer, M.D., Mohn, W.A., and Zabbal, C. (2001), "PCs vs. TVs", *The McKinsey Quarterly*, 3.

OECD (1999), *The Economic and Social Impacts of Electronic Commerce: Preliminary Findings and Research Agenda*.

OECD (2000), *E-Commerce for Development: Prospects and Policy Issues*.

OECD (2000), *E-Commerce: Impacts and Policy Challenges*. Economic Department Working Papers n. 252.

OECD (2000), *Information Technology Outlook*.

OECD (2001), *Communications Outlook*.

OECD (2001), *Consumption Tax Aspects of Electronic Commerce*.

OECD (2001), *Local Access Pricing and E-Commerce*.

OECD (2001), *Measuring the ICT Sector*.

OECD (2001), *Tax Administration Aspects of Electronic Commerce: Responding to the Challenges and Opportunities*.

OECD (2001), *Tax Treaty Characterisation Issues Arising from E-Commerce*.

OECD (2001), *Understanding the Digital Divide*. OECD, Paris.

OECD Committee of Fiscal Affairs (2000), *Clarification on the Application of the Permanent Establishment Definition in e-Commerce: Changes to the Commentary on the Model Tax Convention on Article 5*.

OECD, *Information Technology Outlook 2002*

Office of National Statistics (2002) *Towards a Measurement Framework for International e-Commerce Benchmarking*, Clayton, T., Waldron. K., ONS, London  
[www.statistics.gov.uk/themes/economy/Articles/neweconomy.asp](http://www.statistics.gov.uk/themes/economy/Articles/neweconomy.asp)

OVUM (2000), *Ovum Forecasts the Internet and E-commerce*.

OVUM (2001), *Ovum Forecasts the Internet and E-commerce*. Ovum Ltd., London.

Portuguese Ministry of Science and Technology (1998), *Portuguese Initiative on Electronic Commerce*.

Schuknecht, L. and Perez-Estevé R. (1999), *A Quantitative Assessment of Electronic Commerce*. World Trade Organisation - Economic Research and Analysis Division.

The Boston Consulting Group (1999), *The Race for On-line Riches - E-tailing in Europe*.

The Boston Consulting Group (2000), *Industria: La nuova frontiera del commercio elettronico in Italia - From the Pioneers to the Industrial Age: The New Frontier of Electronic Commerce in Italy*.

*The Winners are..multipractioners* Determinants of success in e-business and new ways of working in selected European countries, Issue Report n.26, May 2002, by Stefan Lilischkis, empirica, STAR project, [www.databank.it/star](http://www.databank.it/star)

UK Cabinet Office (1999), *e-commerce@its.best.uk: A performance and Innovation Unit Report*.

UK Department of Trade and Industry (1999), *Promoting Electronic Commerce*.

UK Department of Trade and Industry (2000), *International Benchmarking Report 2000*.

University of Texas at Austin and Cisco Systems (2001) *Measuring the Internet Economy*.

US Department of Commerce (2000), *Digital Economy 2000*.

WTO (1999), *A Quantitative Assessment of Electronic Commerce*.